

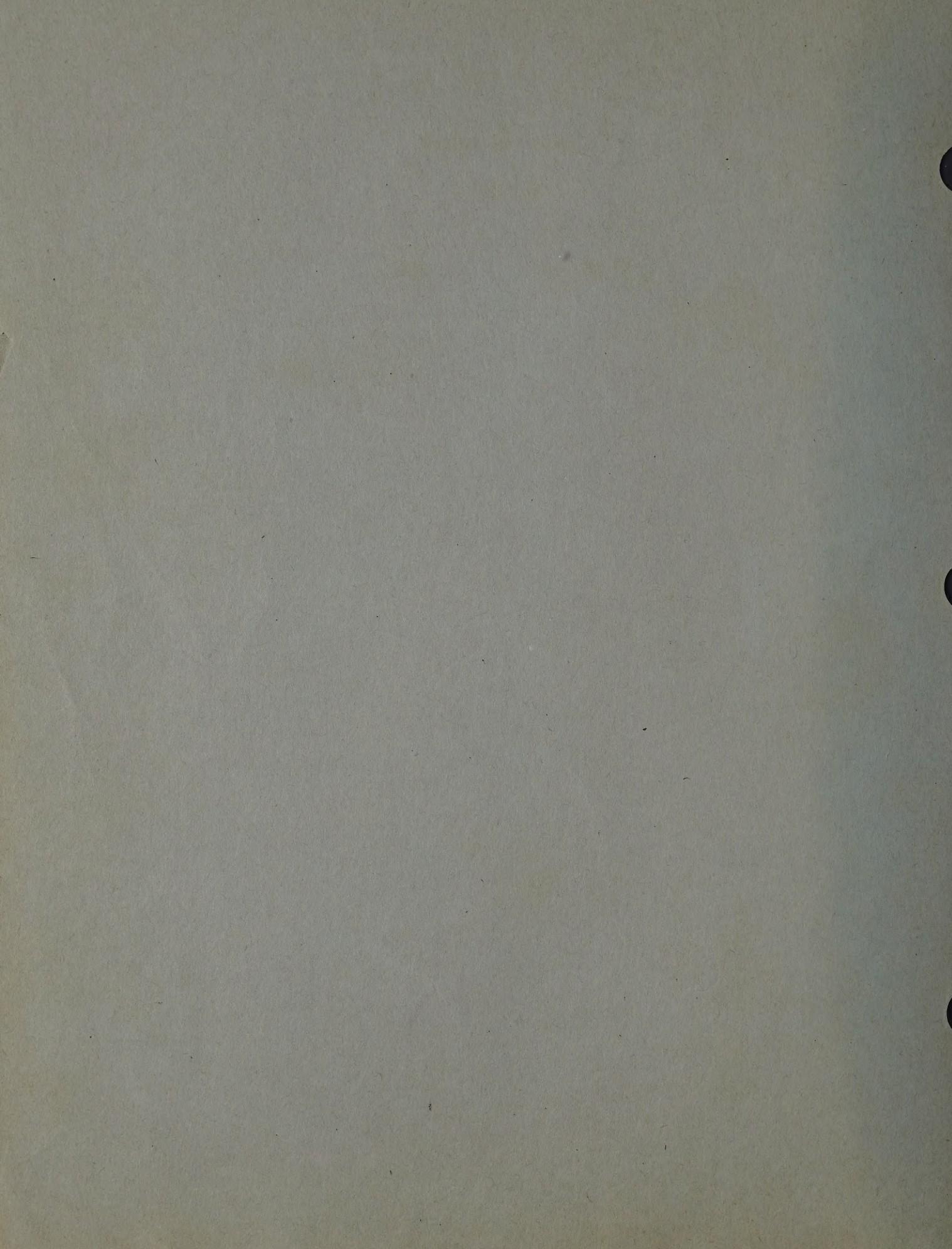
AN 08-30APX1-2

Handbook of  
OPERATING INSTRUCTIONS  
FOR  
MODELS AN/APX-1A  
AND  
AN/APX-1AX  
Aircraft IFF Equipment

R E S T R I C T E D

(For Official Use Only)

Approved 6 JANUARY 1945



C O N T E N T S   L I S T

GROUP B PARTS

AN/APX-1A

OPERATING INSTRUCTIONS

Contract: NXsa 59080

Contractor: HAZELTINE ELECTRONICS CORP.  
NEW YORK, NEW YORK

Manufacturer: STROMBERG-CARLSON COMPANY  
ROCHESTER, NEW YORK

<u>QTY.</u>	<u>S-C PART NO.</u>	<u>HAZ. PART NO.</u>	<u>DESCRIPTION</u>
1	37620	A-9065	RECEIVER-TRANSMITTER TYPE RT-22A/APX1
2	D-10436	CN-1003	CAP (MOUNTED ON RT-22A/APX-1)
1	37619	IB-233	RESTRICTED OPERATING MANUAL

PRINTED IN U.S.A.

42636

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**RESTRICTED**  
**AN 08-30APX1-2**

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## **UNSATISFACTORY REPORT**

### **FOR U. S. ARMY AIR FORCE PERSONNEL:**

In the event of malfunctioning, unsatisfactory design or unsatisfactory installation of any of the component units of this equipment, or if the material contained in this book is considered inadequate or erroneous, an Unsatisfactory Report, AAF Form No. 54, or a report in similar form shall be submitted in accordance with the provisions of Army Air Force Regulation No. 15-54, listing:

1. Station and organization.
2. Nameplate data (type number or complete nomenclature if nameplate is not attached to the equipment).
3. Date and nature of failure.
4. Airplane model and serial number.
5. Remedy used or proposed to prevent recurrence.
6. Handbook errors or inadequacies, if applicable.

### **FOR U. S. NAVY PERSONNEL:**

Report of failure of any part of this equipment during its guaranteed life shall be made on Form N. Aer. 4112, "Report of Unsatisfactory or Defective Material," or a report in similar form, and forwarded in accordance with the latest instruction of the Bureau of Aeronautics. In addition to other distribution required, one copy shall be furnished to the Inspectors of Naval Material at New York, Pittsburgh and Chicago, and to the Bureau of Ships. Such reports of failure shall include:

1. Reporting activity.
2. Nameplate data.
3. Date placed in service.
4. Part which failed.
5. Nature and cause of failure.
6. Replacement needed (yes-no).
7. Remedy used or proposed to prevent recurrence.

### **FOR BRITISH PERSONNEL:**

Form 1022 procedure shall be used when reporting failure of radio equipment.

## **DESTRUCTION OF ABANDONED MATERIEL IN THE COMBAT ZONE**

In case it should become necessary to prevent the capture of this equipment and when ordered to do so, DESTROY IT SO THAT NO PART OF IT CAN BE SALVAGED, RECOGNIZED OR USED BY THE ENEMY. BURN ALL PAPERS AND BOOKS.

### **MEANS:**

1. Explosives, when provided.
2. Hammers, axes, sledges or whatever heavy objects are readily available.
3. Burning by means of incendiaries such as gasoline, oil, paper or wood.
4. Grenades and shots from available arms.
5. Where possible, and when time permits, bury all debris or dispose of it in streams or other bodies of water.

### **PROCEDURE:**

1. Obliterate all identifying marks. Destroy nameplates and circuit labels.
2. Demolish all panels, castings, switch- and instrument-boards.
3. Destroy all controls, switches, relays, connections and meters.
4. Rip out all wiring in electrical equipment. Smash gas, oil and water-cooling systems in gas-engine generators, etc.
5. Smash every electrical or mechanical part, whether rotating, moving or fixed.
6. Break up all operating instruments such as keys, phones, microphones, etc.
7. Destroy all classes of carrying cases, straps, containers, etc.

### **SAFETY NOTICE**

THIS EQUIPMENT EMPLOYS HIGH VOLTAGES WHICH ARE DANGEROUS AND MAY BE FATAL IF CONTACTED BY OPERATING PERSONNEL. EXTREME CAUTION SHOULD BE EXERCISED WHEN WORKING WITH THE EQUIPMENT.

## **DESTRUCTOR WARNING**

Provision is made for the installation of three Destuctors Type AN/M1 in the three destructor jacks of the Receiver-Transmitter Unit Type RT-22A/APX-1 of the Model AN/APX-1A Equipment and the Receiver-Transmitter Unit Type RT-23A/APX-1X of the Model AN/APX-1AX. The greatest care must be observed at all times in handling, inserting, and removing these destructors.

The three destructors must be screwed into their respective jacks *before* the receiver-transmitter unit is installed on its mounting base for flight operation. (*Refer to Figure 2-4.*)

The "D" plug P-911A on cable W-911 must *not* be connected to the receptacle J-104 on the receiver-transmitter until a complete destructor-circuit test has been made (in accordance with Section II, Paragraph 15, of this book) and it has been proved that *no* voltage exists between contacts of this plug. (*Refer to Figures 2-4 and 2-8.*)

**ALL THREE DESTRUCTORS MUST BE REMOVED FROM THE RECEIVER-TRANSMITTER UNIT BY QUALIFIED ORDNANCE PERSONNEL AS SOON AS IT IS MOVED OUTSIDE THE AIRCRAFT. THE RECEIVER-TRANSMITTER UNIT MUST NOT BE STORED, AND NO BENCH TESTS OR MAINTENANCE WORK MAY BE PERFORMED ON IT, UNTIL ALL THREE DESTRUCTORS HAVE BEEN REMOVED.**

Referring to Figure 2-4, it will be seen that the destructor jacks are wired in parallel. Any destructors inserted in their jacks will be exploded by the existence of voltage in the firing circuit, hence, even one destructor carelessly left in its jack is a potential menace to life and equipment.

**THE DESTRUCTORS MUST BE HANDLED AND STORED IN COMPLETE ACCORDANCE WITH EXISTING REGULATIONS DEALING WITH IFF DESTRUCTORS.**

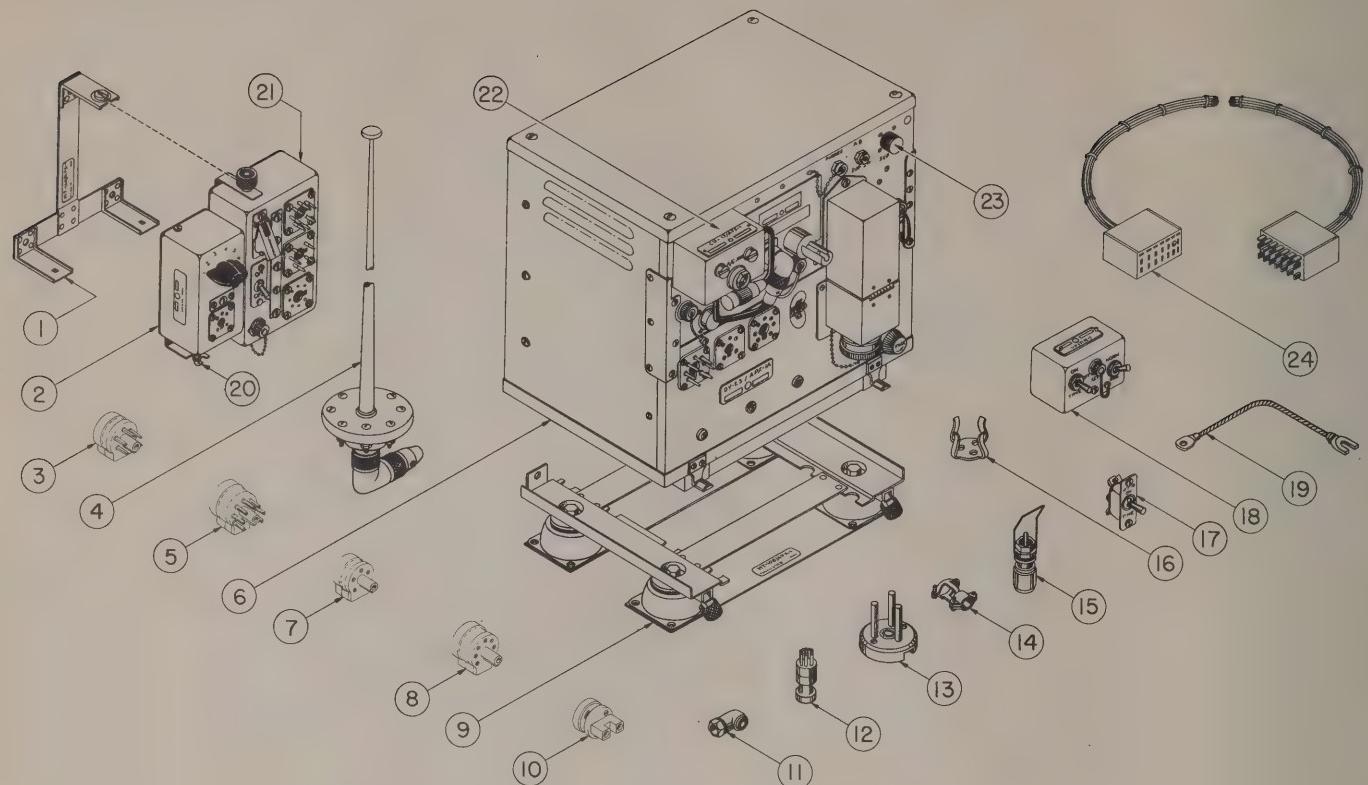


Figure 1-0. Model AN/APX-1A or AN/APX-1AX Equipment

1. Mounting Bracket MT-110/APX-1
2. Selector Unit Type C-55/APX-1
3. 5-pin male plug P-902A, 904A
4. Antenna Assembly Type AS-32/APX-1
5. 7-pin male plug P-903A, P-907A, P-1501A
6. Receiver-Transmitter Unit Type RT-22A/APX-1 (or RT-23A/APX-1X)
7. 5-pin female plug P-906A
8. 7-pin female plug P-901A, P-905A
9. Mounting Base Type MT-108/APX-1
10. "D"-plug P-911A
11. Plug (British 10H/701) P-908A
12. Tube Socket Dummy Plug P-914
13. Miniature Tube Pin Straightener J-901
14. Cable grip assembly P-908B
15. Coaxial Plug Adapter P-901
16. "D"-plug holder H-903
17. IFF-G switch S-901
18. \*Auxiliary Control Unit Type C-53/APX-1
19. Bonding Jumper E-902
20. Securing plate Type MT-109/APX-1
21. Control Unit Type C-54/APX-1
22. Antenna Coupling Unit Type CU-13/APX-1
23. Coaxial Receptacle Cover H-902
24. Service Cable Assembly W-910

\*Supplied only with Bulk Spare Parts.

## **SECTION I**

### **GENERAL DESCRIPTION**

#### **1. APPLICATION OF THIS BOOK TO VARIOUS MODELS.**

a. This handbook relates primarily to the Models AN/APX-1A and AN/APX-1AX Aircraft IFF Equipment.

b. Under certain circumstances, the AN/APX-1A (or -1AX) control units and cabling installation may be used with other types of receiver-transmitter units than the Type RT-22A/APX-1 (or RT-23A/APX-1X), which are included with these equipments. For information on the installation, adaptation, and operation of such other types of receiver-transmitter units, refer to Section IV, Paragraphs 2 and 3.

c. The purpose of this handbook is to list the major units and accessories of the AN/APX-1A (or -1AX) equipment, to furnish information on its installation, preparation for operation, and operation. It is also its purpose to furnish instructions for the use of the AN/APX-1A (and -1AX) control units and cabling with certain receiver-transmitter units of other equipments.

#### **2. EQUIPMENT SUPPLIED.**

a. The AN/APX-1A (and -1AX) equipment supplied is listed below in tabular form; with quantities,

names, dimensions, weights, and numerical series of reference symbols for the various units included. Except for the receiver-transmitter unit and for the service cable (which is supplied in bulk spares) the equipment supplied is the same for either the Models AN/APX-1A or AN/APX-1AX.

b. The receiver-transmitter units supplied comprise an upper unit and a lower unit each of which have their own name plates. The name plate for the receiver-transmitters is found on the right hand end of the wrap around. Name plates for the upper and lower units are found on the front panel of the respective units.

(1) The receiver-transmitter unit used on the 12 volt supply lines is the Type RT-23A/APX-1X and includes an upper unit Type RT-56/APX-1AX and a lower unit Type DY-24/APX-1AX. The upper unit includes a tuning unit Type TN-90/APX-1A.

(2) The receiver-transmitter unit used on the 24 volt supply lines is the Type RT-22A/APX-1 and includes an upper unit Type RT-55/APX (with tuning unit TN-90/APX-1A) and a lower unit Type DY-23/APX-1A.

#### **MAJOR UNITS**

<b>Quantity</b>	<b>Name of Unit</b>	<b>Overall Dimension (Inches)</b>	<b>Weight (Lbs.)</b>	<b>Reference Symbols</b>
1	{ *Receiver-Transmitter Type RT-22A/APX-1..... **Receiver-Transmitter Type RT-23A/APX-1X..... }	13-3/16 x 10 <sup>5</sup> / <sub>8</sub> x 12††	29.2††	
—	Lower Chassis, Wrap-around and cover .....	.....	.....	101-199†
—	Upper Chassis (incl. Tuning Unit Type TN-90/APX-1A) .....	.....	.....	501-699†
1	***Antenna Assembly Type AS-32A/APX-1 or Type AS-32/APX-1 .....	3 x 3 <sup>5</sup> / <sub>8</sub> x 27-7/16 max. 3 x 3 <sup>5</sup> / <sub>8</sub> x 27 <sup>1</sup> / <sub>8</sub> max.	0.8 0.7	801-899
1	Antenna Coupling Unit Type CU-13/APX-1 (sup- plied installed on Receiver-Transmitter Unit).....	3 x 2 x 2 <sup>1</sup> / <sub>4</sub>	0.7	1001-1099
1	Mounting Base Type MT-108/APX-1.....	11-7/16 x 9 <sup>1</sup> / <sub>4</sub> x 2-5/16	2.4	1101-1199
1	Control Unit Type C-54/APX-1.....	6 x 3 <sup>5</sup> / <sub>8</sub> x 2	1.1	1301-1399
1	Selector Unit Type C-55/APX-1.....	4-7/16 x 2 <sup>1</sup> / <sub>4</sub> x 3	0.5	1401-1499
†	Auxiliary Control Unit Type C-53/APX-1.....	3 x 2 x 1 <sup>3</sup> / <sub>4</sub>	0.3	1501-1599
1	Securing Plate Type MT-109/APX-1.....	8 x 5 <sup>1</sup> / <sub>4</sub> x 1 <sup>3</sup> / <sub>4</sub>	0.4	1601-1699
1	Mounting Bracket Type MT-110/APX-1.....	7 x 5 <sup>3</sup> / <sub>8</sub> x 2	0.4	1701-1799

\*AN/APX-1A Equipment only.

\*\*AN/APX-1AX Equipment only.

\*\*\*Either Antenna may be supplied with the AN/APX-1A (or -1AX) equipment. All references throughout this book to an antenna assembly will apply equally to either type. Note, however, differences in clearance dimensions in Figure 4-6.

†Series 151-199 and 651-699 are used in the AN/APX-1AX Equipment only.

‡Supplied with Bulk Spare Parts.

††Overall dimensions include Antenna Coupling Unit Assembled.

Weight does not include Antenna Coupling Unit.

**ACCESSORIES**

(Reference symbols 901 to 999)

Quantity	Name of Unit	Overall Dimension (Inches)	Weight (Lbs.)	Reference Symbols
1	G-Band Switch (AN-3022-6B) with nameplate and mounting hardware.....	2-3/16 x 2 x 7/8	0.09	S-901
2	Plug, 7-pin female—NAF-68925-1.....	15/8 x 15/8 x 13/4	0.15	P-901A, P-905A
2	Plug, 7-pin male—NAF-68925-2.....	15/8 x 15/8 x 13/4	0.15	P-903A, P-907A,
2	Plug, 5-pin male—NAF-68925-3.....	1-5/16 x 11/2 x 1-9/16	0.1	P-902A, P-904A
1	Plug, 5-pin female—NAF-47908-1.....	1-5/16 x 11/2 x 1-9/16	0.1	P-906A
1	"D" Plug—NAF-68969-2 .....	13/8 x 11/4	0.09	P-911A
1	Plug (British 10H/701)—NAF-47848-1.....	1-5/16 x 1-3/16 x 11/16	0.11	P-908A
1	Cable Grip Assembly—NAF-311145-1.....	11/4 x 11/8 x 11/16	0.01	P-908B
1	"D"-Plug Holder—NAF-214841-1 .....	13/4 x 13/4 x 1	0.03	H-903
1	Bonding Jumper .....	63/8 x 11/2 x 3/16	0.01	E-902
2	Coaxial Receptacle Cover .....	7/16 x 3/4 diam.	0.02	H-902
3	***Coaxial Plug Adapter (49194 to 47848-1).....	13/4 x 3/4 diam.	0.06	E-901
1	†Tube Socket Dummy Plug .....	13/4 x 3/4 diam.	0.03	P-914
1	***Miniature Tube Pin-Straightener .....	2 x 2 diam.	0.44	J-901
1	***Phillips Screwdriver .....	7 x 7/8 diam.	0.06	H-901
1	†Service Cable .....	393/4 x 21/4 x 11/8	.....	W-910* or W-951**

\*AN/APX-1A Equipment only.

\*\*\*Supplied only with Operating Spare Parts.

\*\*AN/APX-1AX Equipment only.

†Supplied only with Bulk Spare Parts.

**3. EQUIPMENT REQUIRED BUT NOT SUPPLIED.**

The following table lists equipment not supplied by the equipment contractor but needed for the AN/

APX-1A depending upon which one of the two installation systems is used. See Section II, Paragraph 8 for an explanation of these systems.

Quantity Systems	1B	2B	Name of Unit	Characteristics
1	1		Power Source .....	24v. (AN/APX-1A) or 12v. (AN/APX-1AX) 20-ampere rating
1	1		Fuse H or Circuit breaker.....	
1	1		Impact Switch Type ★SA-3/A.....	
1	—		Pilot's ON-OFF Switch F-3.....	
1	—		Pilot's EMERGENCY Switch F-2.....	
1	—		Pilot's DESTRUCT Switch F-1.....	
1	1		Cable, Coaxial NAF-47024-107 (W-908A).....	Rec.-Trans. P-908A to Antenna P-801
1	1		Cable, 1-Conductor AN-16 (W-911A).....	Rec.-Trans. "D" Plug to Impact Switch L
1	1		Cable, 1-Conductor AN-16 (W-911B).....	Rec.-Trans. "D" Plug to ground
1	1		Cable, 2-Conductor AN-16 (W-912A).....	Impact Switch L to Pilot's Remote Controls F-1 or to Console Control Unit P-1801AB
1	—		Cable, 1-Conductor AN-16 (W-913A).....	Pilot's Remote Controls F-1 to Battery
1	—		Cable, 2-Conductor AN-16 (W-905AO).....	Control Unit P-905A to Power Line
1	—		Cable, 3-Conductor { 2 AN-16 } { 1 AN-20 } (W-906AO).....	Control Unit P-906A to Pilot's Remote Controls F-2 and F-3
1	1		Cable, 4-Conductor { 2 AN-16 } { 2 AN-20 } (W-901AO).....	{ Rec.-Trans. P-901A to Control Unit P-907A or to Console Control Unit P-1801AB }
1	1		Cable, 5-Conductor AN-20 (W-902AO).....	{ Rec.-Trans. P-902A to Selector Unit P-904A or to Console Control Unit P-1801AB }
1	1		Cable, 2-Conductor AN-20 (W-903AO).....	{ Rec.-Trans. P-903A to Pilot's Remote Control S-901 or to Console Control Unit P-1801AB }
—	1		Cable, 3-Conductor AN-16 (W-914AO).....	Console Control Unit P-1801AB to Power Line and + Battery

**4. ALTERNATIVE EQUIPMENT.**

Console Control Unit Type C-119/APX is available on request to BuAer for use on Model AN/APX-1A

in place of the Control and Selector Units furnished. It cannot be used with AN/APX-1AX.

## SECTION II

# INSTALLATION AND ADJUSTMENT

### 1. GENERAL.

a. Paragraphs 2 thru 7 of this section deal with installation of the AN/APX-1A and AN/APX-1AX equipment; the remaining paragraphs of the section deal with pre-operational checks and tests, and with operational adjustments.

b. The aircraft manufacturer is normally responsible for the permanent installation of the following units: the mounting base, control and selector units, the antenna assembly, the pilot's remote switches, and the inter-unit cabling. It is the duty of the service-installation personnel to install the receiver-transmitter on its mounting base, to make the necessary inter-unit cable connections, and to make the specified pre-flight operational checks, tests, and adjustments.

c. If, in the course of the pre-flight checks, it becomes necessary to replace one or more of the permanently installed units, this task should be entrusted to the maintenance crew. Directions appear in the "Handbook of Maintenance Instructions" for AN/APX-1A and AN/APX-1AX. Installation diagrams are shown in Figures 4-3 thru 4-7.

### 2. POWER-SUPPLY SYSTEMS.

a. POWER REQUIRED FOR EQUIPMENT OPERATION.—The AN/APX-1A is designed to operate on aircraft equipped with 24-volt supply lines, while the AN/APX-1AX is for operation on 12-volt lines. Power requirements are shown as follows:

Equipment	Voltage Rating	Supply Voltage	Normal Line Current	Fuse or Breaker H
Model	Volts	Volts	Ampères	Ampères
AN/APX-1A	26	22.5 to 29.5	7.0	20
AN/APX-1AX	13	10.75 to 14.75	15.9	20

b. POWER CABLE.—Power for the operation of either model reaches the control box thru the two-conductor cable assembly W-905. A schematic diagram of this cable wiring is shown in Figure 4-7.

c. EXTERNAL POWER SUPPLY.—Whenever pre-flight tests are to be made on the equipment and the aircraft engine(s) cannot be kept running to supply power in the normal way, an external source of the required d-c power must be provided.

d. POWER FOR DESTRUCTOR OPERATION.—The destructor circuit is wired to the 24- or 12-volt supply line between the battery and the Battery Switch so that operation of this switch will not disconnect the destructor circuit. Also, no fuse is placed

in this line. Hence, whenever the "D" plug is placed in the receiver-transmitter jack, the destructors can be fired by snapping the DESTRUCT switch to the ON position. See Paragraphs 3, 15, and 16 of this Section, for more information on destructors.

### DANGER

Flying fragments resulting from the explosion of the destructors can cause harm to personnel. Always make sure that the "D" plug is in its holder (not in the receiver-transmitter jack) except during flight or as required by existing regulations. Follow existing regulations on the use of the DESTRUCT switch.

### 3. GENERAL INSTALLATION REQUIREMENTS.

a. Figure 4-15 illustrates an installation of the equipment showing the supplementary switches F-2 (EMERGENCY) and F-3 (OFF-ON). Installation and clearance dimensions of the major units are found in Figures 4-3, 4-4 and 4-6. The selector unit should always be placed where it is easily accessible to the pilot. In the event that both the selector and control units (and switches F-1 and S-901) cannot be placed near the pilot, the selector unit should be separated from the control unit (refer to Paragraph 6, sub-section c) and mounted near the pilot together with the four pilot's remote control switches F-1, F-2, F-3 and S-901. The control unit may then be mounted elsewhere in the aircraft. Normally it is not necessary to install switches F-2 and F-3 if the control and selector units are both mounted near the pilot.

b. Before proceeding with any installation or adjustment procedures, check that the above units are in place. Check also that switches S-1301, S-1302 (on the control unit), F-1, F-2, F-3, and S-901 (on pilot's remote switch panel) are in the OFF position, and that the red guard cover is closed over the DESTRUCT switch F-1. On the selector unit check that the switch S-1401 is in position "1".

### 4. PRE-INSTALLATION TESTS AND CHECKS OF THE RECEIVER-TRANSMITTER.

a. Before installation personnel accept the receiver-transmitter unit for installation on its mounting base in the aircraft, they should check that:

(1) The receiver-transmitter has been completely bench tested and adjusted and is in good operating condition. Insure that the SUP switch S-501 is in its proper position (A).

(2) Destructors are installed (or omitted) in accordance with current instructions.

b. If destructors are to be used, they should be fitted after completion of all bench tests and adjustments, just prior to installation of the receiver-transmitter in the aircraft and immediately after the following test procedure:

#### **WARNING**

All destructor firing circuit tests must be made using a good two-range voltmeter. Final checks for no voltage should be made using a low range scale suitable for indicating potentials less than 0.1 volt. This step is imperative as a safety precaution since a very small voltage will explode the destructors.

(1) Check each of the three destructor jacks to make absolutely certain that no destructors are installed.

(2) Note, the next step will explode any destructor(s) that may have been left in place thru negligence in step (1) above. Apply rated d-c voltage to the destructor power input receptacle J-104 on the receiver-transmitter—the positive lead to one pin and the negative lead to the remaining pin.

c. Check each of the three destructor jacks for full applied voltage. Do this by connecting one voltmeter prod to the threaded bushing of the destructor jack, and touching the second voltmeter prod to one of the inner spring contacts of the destructor jack. It is suggested that the voltmeter prods be wrapped with friction tape to within a half inch of the tip to prevent the prods from shorting the destructor jacks during the tests. The testing activity may find it desirable to design a special plug for this purpose to permit rapid testing of a large number of sets.

d. Disconnect the applied voltage from the destructor power input receptacle J-104 and test each destructor jack for no voltage.

e. Correct any defects noted during these tests before installing destructors and before releasing the equipment for installation in aircraft.

#### **WARNING**

Installing and removing destructors, indeed all handling, testing, and storing of destructors, must be done OUTSIDE THE AIRCRAFT by qualified ordnance personnel, if available, observing all existing regulations dealing with IFF destructors.

### **5. INSTALLATION AND REMOVAL OF RECEIVER-TRANSMITTER UNIT.**

#### **a. INSTALLATION OF THE RECEIVER-TRANSMITTER ON ITS MOUNTING BASE.**

(1) In carrying the receiver-transmitter unit to and into the aircraft in which it is to be installed, handle it with extreme care.

(2) Install the receiver-transmitter unit on its mounting base in accordance with the following procedure. (Refer to Figure 4-3.)

(a) On the front edge of the mounting base unscrew the two knurled clamping collars H-1101 as far as they will go.

(b) Carefully place the receiver-transmitter unit on the mounting base and slide it toward the back until the two tapered hold-down plungers O-103 engage the holes provided for them in the angle members A-1101 at the rear of the mounting base.

(c) Clamp the receiver-transmitter in position by raising the two knurled clamping collars H-1101 and screwing them tightly over the front hold-down lugs A-105 on the lower front edge of the bottom cover of the receiver-transmitter. Thread a piece of No. 16 A.W.G. steel tie-wire (0.051-inch diameter) thru one of the four holes in each clamping collar. Draw the wire tight and twist the ends around each other as though making a splice. Use a fresh piece of wire, if available, since a wire that has been "spliced" several times before is more likely to break during flight and allow vibration to loosen the clamping collars.

(d) Loosen the machine screw H-103 on the lower front edge of the receiver-transmitter. Slip the free (forked-lug) end of the bonding jumper E-902 under the lockwasher that lies under the head of H-103 and tighten the screw so that the bonding jumper is held firmly and makes good electrical contact with the unpainted face of the staked bushing into which H-103 is screwed.

(e) Keep the "D" plug in its holder. Put all other plugs back in the correct receptacles of the receiver-transmitter unit.

#### **b. REMOVAL OF THE RECEIVER-TRANSMITTER FROM ITS MOUNTING BASE.**

(1) Remove the receiver-transmitter unit from its mounting base by reversing the above procedure, as follows:

(a) Disconnect the forked-lug end of the bonding jumper E-902 from under the head of the screw H-103 and re-tighten the screw so that there will be no danger of its loss. Release antenna hold-down wires; then pull off all plugs.

(b) Remove the safety tie-wire from the two knurled clamping collars H-1101 and unscrew the collars for about half an inch, until they can be disengaged from the hold-down lugs A-105. Allow the clamping collars to swing downward out of the way.

(c) Pull the receiver-transmitter unit an inch or so toward the front edge of the mounting base to disengage the tapered hold-down plungers O-103 at the rear. Carefully draw the unit forward or lift it clear of the mounting base and remove it from the aircraft.

(2) Promptly upon removal of the unit from the aircraft, the three Destuctors Type AN/M1 must be unscrewed and removed from their respective destructor jacks. (Refer to Figure 2-4.) The destructors must be handled and stored in complete accordance with existing regulations dealing with IFF destructors.

**WARNING**

Thoroughly re-check that no destructor is accidentally left in its jack in the receiver-transmitter unit.

(3) The receiver-transmitter unit then may be stored in accordance with existing regulations governing the storage of IFF receiver-transmitter units.

**CAUTION**

Never work on the transpondor unit nor make tests other than pre-flight tests, while the destructors are in their jacks.

## 6. INSTALLATION OF CONTROL AND SELECTOR UNITS.

a. GENERAL.—The selector and control units (C-55/APX-1 and C-54/APX-1, respectively) are supplied mounted on the securing plate Type MT-109/APX-1 and form a control-and-selector unit assembly.

b. MOUNTING CONTROL AND SELECTOR UNITS. (Refer to Figure 4-4.)—To mount the combined control-and-selector unit assembly, unscrew the knurled clamping nut H-1601 at the top of the securing plate and insert the two lugs at the bottom into the corresponding slots in the mounting bracket MT-110/APX-1. Gently push the assembly back into the mounting bracket, guiding the screw carrying the clamping nut at the top into the slot.

Be sure that both bottom lugs engage the slots properly and, when they do, tighten the knurled clamping nut. Put all four plugs—battery-cable assembly last—in the correct receptacles. Thread safety wire thru the nut H-1601, draw tight, and twist the ends together.

This completes the installation of the control-and-selector unit assembly.

c. REMOVAL OF CONTROL AND SELECTOR UNITS.—To remove the combined control-and-selector unit assembly first pull out the plugs, being sure that the battery-cable assembly W-905 is disconnected first. Next, remove the safety wire from the knurled clamping nut H-1601 and loosen by unscrewing it. Pull it forward and simultaneously lift the assembly out of the mounting bracket. This combined pulling and lifting motion will disengage the two mounting lugs H-1602 on the bottom of the securing plate from the slots in the mounting bracket.

The control unit can be taken off the securing plate by removing three machine screws on the back. The selector unit can be taken off in a similar manner by removing two screws.

d. CONSOLE CONTROL UNIT.—A special control unit not furnished with the AN/APX-1A but available upon request to BuAer will permit installation of all AN/APX-1A controls intended for pilot use into a standard Navy radio and electric console in aircraft so equipped. The outline dimensions of this control unit (Type C-119/APX) are shown in Figure 4-5. The schematic diagram of this control unit is shown in Figure 4-14.

For such installations, the console control unit replaces the control-and-selector unit assembly and the pilot's remote control switches. A pictorial installation diagram is shown in Figure 4-16.

## 7. INSTALLATION OF THE ANTENNA ASSEMBLY TYPE AS-32/APX-1 OR AS-32A/APX-1.

(Refer to Figure 4-6)

a. The equipment is supplied with and designed to be used with one antenna. The antenna installation is made by the aircraft contractor.

b. The antenna is mounted directly on the skin of the aircraft, utilizing a reinforcing insulating base plate to ensure adequate mechanical support. To mount an antenna:

(1) Cut away a 2 1/8-inch diameter hole and drill eight 0.157-inch diameter holes in the aircraft skin, as shown in Figure 4-6.

(2) Remove the eight 6-32 screws (with washers and nuts) from the base plate and mount the base plate with its gasket inside the aircraft skin with the eight 6-32 screws inserted from outside the skin.

(3) The metal shell of the antenna base should be securely grounded to the aircraft skin and electrical insulation (10 to 20 megohms) between the antenna base and the antenna rod should be maintained after the antenna assembly has been installed.

(4) In the event that it is necessary to locate an antenna on a fabric-covered section of the aircraft, it should be mounted on a suitable circular metal reflector, which has a radius of not less than 17 inches.

c. The antenna should be located so that the following considerations are satisfied insofar as practicable:

(1) The antenna rod is vertical during flight.

(2) The antenna is located as far as possible from other antennas.

(3) The antenna should be located—

(a) So as to provide as nearly as possible an omni-directional pattern.

(b) So that the addition of bombs, torpedoes, and other provisioned armament and accessories will have a minimum effect on its performance.

(c) So that it will not come in contact with concentrated exhaust gases or empty cartridge shells.

(d) So that it will occasion a minimum of interference to bomb and handling crews.

## 8. INTER-UNIT CABLING.

### a. CABLING AND INSTALLATION SYSTEMS.

—Two systems of cabling and installation are used with AN/APX-1A equipment. These systems are identified by numbers and letters and are known as the 1B, and 2B systems (or installation systems). The number indicates the type of controls: 1 for regular controls (as in Figure 4-15); and 2 for console controls (as in Figure 4-16). The letter indicates the type of cabling: A for shielded multi-conductor cables; and B for open-wire cabling. It is not intended that shielded cables be used in the AN/APX-1A and -1AX installations.

The cabling and installation systems used are therefore:

System 1A—not used.

System 2A—not used.

System 1B—open-wire cabling, regular controls: (Figure 4-15).

System 2B—open-wire cabling, console controls: (Figure 4-16).

Because the switches in the console control unit will not carry the necessary current, the 2B system cannot be used with AN/APX-1AX equipment.

Although the current carrying capacity of the wiring in the 1B system described in Figure 4-15 is adequate for the Model AN/APX-1AX, the 12-volt model 1B system will probably not be encountered in U. S. Navy service.

c. CABLE CONSTRUCTION.—The components required in wiring an installation are identified in the pictorial and wiring diagrams (Figures 4-8 and 4-15). In these figures the cables and plugs are identified by symbol numbers and AN or NAF numbers. Detailed instructions for constructing the open wire cables used in a 1B or 2B installation system are given in Paragraphs 10 and 11 of this section and in Figures 4-10 and 4-11 of Section IV.

The antenna cables are alike in both the 1B and 2B installation systems and are constructed as explained in Paragraphs 12 and 13 and as shown in Figures 4-12 and 4-13.

## 9. CABLE-AND-PLUG ASSEMBLIES.

a. TOOLS REQUIRED.—The following tools should be available if a workmanlike job of attaching plugs to cables is to be done. Some of them may be omitted, but the work will be considerably easier if all of them are at hand.

(1) Large cutting pliers or a fine-toothed hacksaw for cutting and squaring the ends of cables.

(2) A sharp, heavy-bladed knife for cutting insulation.

(3) Diagonal-nose cutting pliers for cutting insulation and trimming wires. They should be sharp and ground to cut at the very ends of the jaws. If properly adjusted, they should be able to grip and

cut a single straight strand of the braided shield as it lies on the flat top of a bench.

(4) A pair of heavy blunt-nose electrician's scissors for trimming insulation and braided shielding. These are not absolutely necessary, if good diagonal-nose pliers are available.

(5) A screwdriver with a blade about  $\frac{1}{4}$  inch wide for separating the plug body and cap.

(6) A small screwdriver with a blade no wider than  $\frac{3}{32}$  inch for use on the setscrew in the antenna cable plug.

(7) An open-end wrench with a  $\frac{5}{8}$  inch opening for use on the hexagonal compression nuts of P-908A.

(8) A vise or large clamp to aid in the preliminary tightening of P-908A.

(9) A scribe or other sharp-pointed tool to aid in unraveling braided shield.

(10) A small soldering iron and a supply of rosin-core solder.

(11) A stiff brush for removing pieces of solder and shreds of braid from the insides of the plugs.

### b. GENERAL PRECAUTIONS.

(1) Remove all spatterings of solder and shreds of wire strands from within the plugs where they might result in short circuits. Do not use acid flux.

(2) In removing the insulated covering from cables, take care to avoid cutting the copper shield braid or other conductors underneath. Stretching the



Figure 2-1. Method of Cutting Outer Covering of Cable

outer covering by bending the cable and then cutting on the outside of the bend facilitates the correct removal of the insulated covering. (Refer to Figure 2-1.)

(3) Avoid overheating the insulators in the plugs and cables. If prolonged heating is unavoidable, protect the insulators with wet thread or cotton.

(4) The minimum bending radius for all cables is three inches, allowing for maximum sway of the receiver-transmitter on its mounting base. (Refer to Figure 4-3.)

(5) The antenna cable should be limited to a length of 30 feet if practicable.

(6) After final fabrication of each cable-and-plug assembly, check for continuity at the plug with an ohmmeter by joining all conductors at the other end of the cable. Then check against the presence of shorts by having all conductors separate at the other end of the cable and seeing if very high resistance is found between every pair of terminals at the plug.

## 10. ASSEMBLING MULTI-CONDUCTOR CABLES.

a. GENERAL.—Connection cables between the upper unit and the antenna coupling unit are part of the equipment. Eight other cables, including wiring to the plugs must be constructed. Cables should be as short as possible but should meet all requirements.

The antenna cable is coaxial and enclosed in a rubber or vinylite sheath. The other seven cables consist of individual wires bunched together to form open-wire cables.

In fabricating the open-wire cables care should be taken to ensure that the cables will be long enough to reach between the designated units and have sufficient slack to allow proper vibratory motion of the set. This eliminates the danger of a plug being yanked from its socket by a taut cable.

After wiring the cables to the proper plug terminals, the individual wires should be closely bound together at the point where the wires enter the plug with enough friction tape so that the cable will fit snugly when the plug cover is replaced.

b. REFERENCES.—A complete description of the assembly of the antenna cable and its attendant plugs is given in Paragraph 12 of this Section and in Figures 4-12 and 4-13.

The proper procedure for assembling the open-wire cables and plugs is shown in Figure 4-10.

The inter-unit wiring and pictorial diagrams are shown in Figures 4-8, 4-9, 4-15, and 4-16.

## 11. PILOT'S REMOTE CONTROL SWITCHES.

a. GENERAL.—The complete wiring of cables for an installation includes wiring of the pilot's remote control switches. When the control-and-selector units are mounted within easy access of the pilot, cable assembly W-906 and switches F-2 and F-3 will not be necessary. Wiring details of these units are, however, given.

It will still be necessary to have the DESTRUCT switch F-1 and the "G"-band switch S-901 correctly wired. Details regarding the wiring of these switches are given in the paragraphs which follow. The arrangement of these switches should agree with that

shown in Figure 4-15. The schematic wiring diagram of these switches is shown in Figure 4-7.

### b. WIRING THE DESTRUCT SWITCH F-1.

(1) This is an OFF-ON switch on the left of the panel, having a red molded guard with DESTRUCT lettered in black on it.

(2) This switch has its terminals wired to the separated wires of Cable W-912A (AN-16) as shown in Figures 4-11 and 4-15, and in the schematic diagram, Figure 2-4. After connecting the wires to the switch make certain the switch is firmly mounted in position. Plug wiring details are shown in Figure 4-11. Follow instructions given in this section, Paragraph 10.

(3) Check the switch terminals as follows (before wiring to the "D" plug):

(a) Connect test leads from an ohmmeter across the terminals of the switch F-1.

(b) Lift the guard and keep switch lever OFF.

(c) The ohmmeter should now read infinite resistance (no deflection).

(d) Snap the switch ON.

(e) The ohmmeter should now read zero ohms (full scale deflection if meter has been previously adjusted to zero).

(f) Snap switch OFF and lower guard fully. Complete the wiring as shown in Figure 2-4, 4-11, and 4-15.

### c. IMPACT SWITCH. (Refer to Figure 2-5.)

(1) The Impact Switch Type ★SA-3/A is wired to the Cable W-911 so that it is in parallel with the DESTRUCT switch. Connection is made by means of two separate wires which are wired inside the impact switch.

(2) Prepare the ends of the wires by stripping off the insulation for a length of  $\frac{3}{4}$  inch, twisting the strands of each wire together, and tinning with a small amount of solder. Remove the back plate of the impact switch and locate two terminal machine screws. Loosen the screws, bend the end of one wire under one screw in a clockwise direction, and the end of the other wire under the other screw similarly. Making sure that there is no possibility of contact between the two wires, tighten the screws, and replace the back plate, bringing the two wires thru the grooves provided.

### d. WIRING EMERGENCY SWITCH F-2 AND OFF-ON SWITCH F-3.

(1) When used, these switches are wired to cable W-906AO as shown in the wiring detail, Figure 4-11, or in the cable schematic, Figure 4-7. As seen in these figures one wire of the three-conductor cable connects to one terminal of switch F-2. A second wire of this cable is connected to one terminal of F-3. The third wire connects to the common connection between F-2 and F-3.

(2) The wiring detail at the plug end is shown in Figure 4-10.

e. WIRING IFF-G SWITCH S-901.

(1) This switch is at the extreme right of the pilot's control switch panel in Figure 4-15. The wiring details at the rear of the switch are shown in Figure 4-11.

(2) After the switch is mounted and wired to the plug P-903A, it should be tested for continuity with an ohmmeter. A summary of the tests follows:

(a) There should be continuity (closed circuit) between terminals 4 and 7.

(b) With the switch off, the circuit between terminals 1 and 7 should test "open".

(c) The circuit should show "closed" between pins 1 and 7 when switch S-901 is set to ON or TIME.

(d) The switch should snap back automatically from TIME when released.

(e) Resistance tests between any other two pins should indicate "open".

## 12. ASSEMBLING ANTENNA CABLE.

a. GENERAL.—The NAF-47024-107 (or RG-8/U) coaxial cable is composed of a copper core of 7-strand wire surrounded by a high frequency insulation of light-colored flexible material. This insulation is encased in a copper braid shield, which in turn is covered with rubber or vinylite, a synthetic rubber.

A cross-sectional view of the coaxial cable, used in assembly W-908, is shown in Figure 4-12. This figure also illustrates the correct procedure for connecting the coaxial cable to the Navy Type 49195 straight plug (P-801), as required on the antenna end of the assembly W-908. It also shows the Navy Type 49192 right-angle connector mechanically coupled to the Navy Type 49195 straight plug.

Figure 4-13 shows the correct procedure for connecting the coaxial cable to the angle plug P-908A (NAF-47848-1, British 10H/701) as used with the cable grip assembly P-908B (NAF-311145-1) on the receiver-transmitter end of the assembly W-908. Additional notes are given in sub-sections b, c and d below.

### b. COAXIAL CABLE PREPARATION—GENERAL NOTES.

(1) Cut the cable to the required length and square off the ends with a fine-tooth hacksaw or a pair of large cutting pliers. Then remove the specified length of outer insulation by rolling the cable under a sharp knife to cut thru the outer jacket, making an axial cut down to the cable end, and stripping off the outer insulation to expose the copper shield braid.

#### Note

Keep the cutting edge of the knife sharp and occasionally dip it in water, which will act as a lubricant.

(2) Trim off the copper shield braid to the specified distance and tin the remaining exposed portion

of the copper shield with a small amount of solder. If too much is used, gently file off the excess so that later the cable can enter the plug without difficulty. (This applies to Figure 4-12, but not to Figure 4-13.)

(3) Trim off the inner high-frequency insulation to the specified length. Cut a ring by rolling the cable under the cutting edge of a knife and make an axial cut or cuts down to the cable end so that the insulation may be stripped off up to the ring, exposing the stranded copper core.

(4) Twist and tin the exposed portion of the stranded copper core with a small amount of solder.

### c. ATTACHMENT OF THE NAVY TYPE 49195 PLUG TO THE COAXIAL CABLE END—GENERAL NOTES.

(1) Loosen the set screw on the plug shell to disassemble the plug. Slide the plug shell and then the locking ring on the cable.

(2) In tinning the inside of the plug-body tip, make sure that no solder runs back into the plug beyond the plug insulator. If a large soldering iron is used, wrap a wet string around the plug-body tip to protect the plug insulator from overheating.

(3) In soldering the end of the inner conductor to the plug-body tip, wrap a wet string around the tip and apply the soldering iron with a small amount of solder until a strong connection is made between the tip and the conductor. Make sure that the end of the inner conductor does not project beyond the end of the plug-body tip (it should be about 1/16 inch from the extreme end of the tip) and that no surplus solder is attached to the outside surface of the tip or is clumped at the tip end.

(4) In soldering the copper shield braid to the plug body, flow solder into the plug-body holes after fluxing with non-corrosive flux. To insure good contact, spread the solder somewhat around the holes.

### d. ATTACHMENT OF THE BRITISH TYPE PLUG P-908A TO THE COAXIAL CABLE END—GENERAL NOTES.

(1) Disassemble the plug P-908A as shown in Figure 4-13, discarding the cylindrical sleeve, which is not used.

(2) Slide the hexagonal compression nut on the cable until its shoulder end comes up tight against the end of the outer insulation. Keep the nut pushed up hard throughout the succeeding operations so that the finished cable will be well supported.

(3) In unraveling the end of the copper shield braid and fanning out its wires, make sure that the wires are uniformly distributed and as free as possible from crossovers. Wedge the split sleeve between the inner high-frequency insulation and the braid. Pressure with the fingers or a small vise should force the flange of the sleeve to within about 1/16 inch of the hexagonal compression nut. After trimming away the high-frequency insulation to the specified distance and twisting and tinning the end of the inner conductor,

screw the empty plug body into the compression nut to force the split sleeve all the way in. Then remove the plug body and trim off any remaining pieces of copper braid that may still protrude between the split sleeve and the nut.

(4) Use the translucent cylindrical insulator as a gage to make sure that when the inner conductor is slid into the long axial hole in the insulator and the insulator is pushed tightly against the exposed portion of inner high-frequency insulation, the end of the conductor extends almost to—but does not quite touch—the wall in the end of the insulator. (If the conductor touches the end of the insulator, the latter may be broken when the plug is assembled; if the conductor is not long enough, the grub screw will not engage it when the plug is assembled.)

(5) After making sure that the right length of inner conductor is exposed, replace the cylindrical insulator in the threaded end of the plug body, rotating the tube so that its "straight-through" hole lines up with the axial hole of the cylindrical insulator that receives the conductor.

(6) If the cable-grip assembly is to fit properly, the plug face must be parallel with a flat side of the hexagonal compression nut after the plug and nut have been tightly screwed together. The two halves of the grip assembly should be placed so that the thin lateral sections rest on the plug body, the wire lateral sections rest on the cable, and the hexagonal compression nut is between the two. Tighten down the cable-grip screws so that the plug and cable are firmly gripped.

**Note**

The length of the antenna cable assembly should be the minimum necessary to make a good connection between the receiver-transmitter and the antenna. The cable, whenever practicable, should be limited to 30 feet in length and have a minimum bending radius of three inches.

**13. CABLE-AND-PLUG ASSEMBLY TESTS AND INSTALLATION.**

a. After the cables have been assembled they should be tested for continuity between corresponding numbers of the plug terminals at each end of a cable, as indicated in Figures 2-3 and 4-7.

b. There should be no breakdown between terminals, except where they are connected together. Some such connections are shown in Figure 4-7. An ohmmeter may be used to make this test though there should be no breakdown if 500 volts a-c is used.

c. **INSTALLATION OF THE CABLE-AND-PLUG ASSEMBLIES.**—Install the inter-unit cabling as shown in Figure 4-15.

**CAUTION**

Make sure all switches are OFF before inserting any cable plugs into their receptacles.

After the cables and plugs have been tested for continuity or shorts they may be connected to the major units.

(1) Do not put the "D" plug in the receptacle J-104 (Figure 2-8) of the receiver except as explained in Section II, Paragraph 15. Follow existing regulations concerning the use of the "D" plug.

(2) Insert other plugs in the correct jacks, leaving power line plug, P-905A, out until last.

**14. INSTALLATION CHECKS.**

*(Refer to Figure 4-6 and Figure 4-15)*

a. Before checking the destructor-firing circuits or making the pre-flight tests and operating adjustments described in Paragraph 20 thru 28 inclusive, check the AN/APX-1A (or -1AX) installation thoroughly.

b. Figure 2-2 contains directions for making the following installation checks:

- (1) Antenna installation.
- (2) Pilot's remote switches.
- (3) Control unit installation.
- (4) Selector unit installation.
- (5) Inter-unit cabling installation.

c. Figure 2-3A is a table of resistance checks made between the contacts of the inter-unit plugs. These tests should be made to test the complete inter-unit cable-and-plug assemblies and control units wiring circuits.

d. Figure 2-3B is a table of resistance and voltage checks made between specified contacts of the receiver-transmitter unit plugs. These checks may be used to test the operation of the switches in the control-and-selector units.

**Note**

It is not necessary to perform the checks specified in Figure 2-3 unless improper operation of the control unit switches has been indicated or suspected.

**15. CHECK THE DESTRUCTOR-FIRING CIRCUITS.**

a. If destructors are fitted and firing circuits are connected in accordance with current instructions, the following step-by-step test procedure should be adhered to:

**WARNING**

Never, under any circumstances, connect the "D" plug P-911A to the receptacle J-104 on the receiver-transmitter unit until a complete destructor-firing circuit test has been made.

All destructor-firing circuit tests must be made using a good two-range voltmeter. Final checks for no voltage should be made using a low range scale suitable for indicating potentials less than 0.1 volt. This step is imperative as a safety precaution since a very small voltage will explode the destructors.

**AN/APX-1A (or -1AX) EQUIPMENT INSTALLATION CHECKS****1. ANTENNA INSTALLATION.**

<i>Check</i>	<i>Reference Figures</i>
a. Mounting bolts and nuts tight; base securely attached to fuselage with lockwashers in place.	4-6
b. Antenna rod E-801 straight, free from cracks, securely screwed into base with lockwasher H-801 in place.	
c. Insulating mountings clean, dry, unbroken.	
d. Withdraw P-1002 from A ANT J-507 and P-1004 from G ANT J-501; check for 10 to 20 megohm resistance between inner contact and plug body of P-1002 and P-1004.	2-8
e. Ground antenna rod to fuselage; check for continuity between inner contact and plug body of P-1002 and P-1004. (Remove ground after check is made.)	
f. If d. discloses a short or e. an open circuit: withdraw P-908A from A/G ANT J-1001 and repeat checks to isolate defect in antenna assembly and W-908 or in antenna coupling unit and W-1001 and W-1002.	
g. Re-connect all plugs to proper receptacles.	4-15

**2. CONTROL-AND-SELECTOR UNIT INSTALLATION.**

<i>Check</i>	
a. Units securely mounted.	4-4
b. Plugs P-905A, P-906A, P-907A and P-908A securely and fully plugged into proper receptacles.	
c. OFF-ON S-1301 and EMERGENCY S-1302 are OFF and S-1302 secured with safety wire.	2-9
d. Selector switch S-1401 set in position "1."	

**3. PILOT'S REMOTE CONTROL SWITCHES.**

<i>Check</i>	
a. DESTRUCT switch F-1 OFF, its red guard cover down and secured with safety wire.	4-15
b. IFF-G switch S-901 OFF.	
c. OFF-ON switch F-3 OFF, EMERGENCY switch F-2 (if used) OFF and cover secured with safety wire.	

**4. RECEIVER-TRANSMITTER UNIT INSTALLATION.**

<i>Check</i>	<i>Reference Figures</i>
a. Unit securely installed on base; securely mounted.	4-3
b. Bonding jumper E-902 securely attached to base and under screw H-103 of receiver transmitter.	
c. Captive screw H-116 secures inter-chassis connector cover A-103.	
d. Covers H-902 screwed on unused coax. receptacles (normally SUP J-506 and I-R ANT COUPLING J-508).	2-8
e. Cap and chain securely screwed on PHONES jack J-504.	
f. Wrap-around secured by machine screws and lockwashers: 6 on each side, 4 in rear. Top cover secured by 4 cowl fasteners H-104.	4-3
g. If type AN/M1 Destructors have been installed: all three firmly screwed into jacks in upper front panel and jack covers screwed in place.	2-4
h. Plugs P-101, P-102 and P-103 fully and securely plugged into proper receptacles.	4-15
i. P-911 not connected to J-104 until destructor-firing circuit test has been made.	
j. P-908A (W-908) connected to A/G ANT J-1001; cable grip assembly P-908B tight.	
k. P-1002 and P-1001 (W-1001) connected to A ANT J-507.	
P-1004 and P-1003 (W-1002) connected to G ANT J-501.	
l. SUP SW S-501 set to position "A."	
m. Check for presence of fuse F-101 and spare fuse F-102.	

**5. INTER-UNIT CABLING INSTALLATION.**

<i>Check</i>	
a. No sharp bends, signs of excessive strain, cracks or frays in insulation over entire accessible length of inter-unit cabling.	4-15
b. No cracked, loose, or missing parts in any plug.	
c. Contact surfaces of all plugs and receptacles clean. (Clean with carbon tetrachloride.)	
d. Aircraft power-supply bus and impact switch connections correct and tight.	
e. Continuity OK and no short-circuits. (Refer to Figure 2-3 for specified tests.)	4-7
f. Check with referenced figures and chart to make sure that each cable plug (except "D" plug P-911A) is plugged into the correct jack.	

**Figure 2-2. Equipment Installation Checks**

### **WIRING CHECKS OF INTER-UNIT CABLING AND CONTROL UNITS.**

Resistance tests made between contacts of P-901A, P-902A, and P-903A with all plugs disconnected from their receptacles in the receiver-transmitter unit. Refer to Figure 4-7. Cabling connections and control settings as specified in Figure 4-7: selector switch in position "1," all other switches OFF.

<i>Connect Ohmmeter Between Contacts</i>	<i>Correct Indication</i>		
4 and 7 of P-903A.....	any two other contacts of P-902A.....	1&2, 1&5, 2&5, 3&5)	open circuit
any two other contacts..... (1&2, 1&3, 1&4, 1&5, 1&6, 1&7, etc.)	closed circuit	1, 2, & 3 of P-901A.....	closed circuit
2 and 3 of P-902A.....	open circuit	6 and 7 of P-901A.....	closed circuit
2 and 4 of P-902A.....	closed circuit	any two other contacts of P-901A..... (3&4, 4&5, 1&4) (3&5, 4&6, 1&5) (3&6, 5&6, 1&6)	open circuit
3 and 4 of P-902A.....	closed circuit		

### **OPERATING CHECKS OF CONTROL SWITCHES.**

NOTE: These tests should be made only when defective connections or switching is suspected.

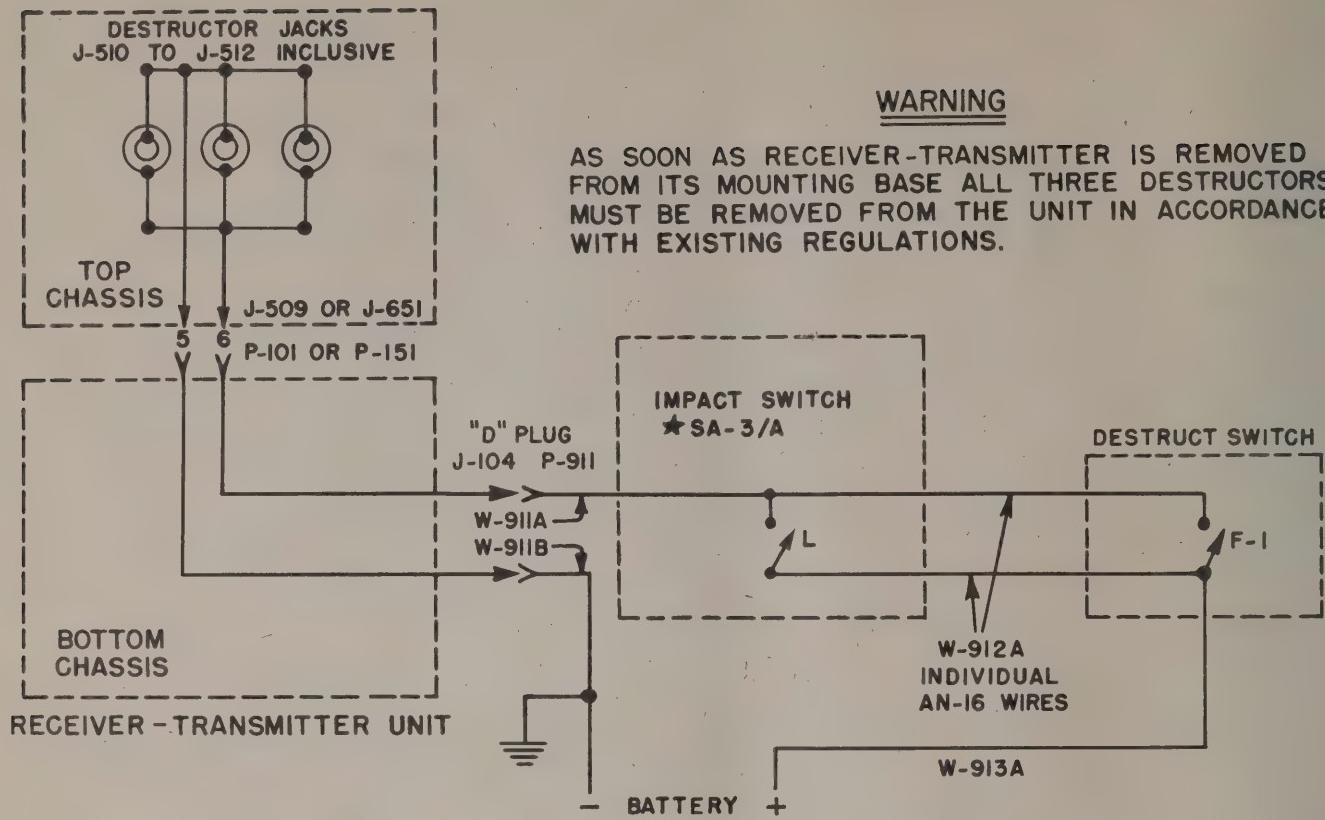
Tests made with plugs P-901A, P-902A, P-903A, and P-911A removed from their receptacles in the receiver-transmitter unit.

<b>VOLTAGE CHECKS.</b>			
<i>Switch Position</i>	<i>Connect Proper Type Voltmeter Between P-901A Contacts</i>	<i>Correct Indication</i>	
a. S-1301 or F-3 ON.....	1, 2 or 3 and 6 or 7.....	24 volts dc in -1A (or 12 volts in -1AX)	c. S-901 ON .....1 and 4, 1 and 7 of P-903A .....closed circuit
b. S-1301 (or F-3) and S-1302 or F-2 ON.....	1, 2, or 3 and 5.....	24 volts dc in -1A (or 12 volts in -1AX)	S-901 held to TIME .....1 and 4, 1 and 7 of P-903A .....closed circuit
			d. S-1401 in position "1".....2, 3&4 of P-902 all other combinations .....open circuit
			e. S-1401 to position "2".....any two contacts of P-902A .....open circuit
			f. S-1401 to position "3".....2 and 4 of P-902A .....closed circuit any two other contacts of P-902A .....open circuit
			g. S-1401 to position "4".....1 and 5; 2, 3, and 4 of P-902A .....closed circuit any two other contacts of P-902A .....open circuit
			h. S-1401 to position "5".....1 and 5 of P-902A .....closed circuit any two other contacts of P-902A .....open circuit
			i. S-1401 to position "6".....1 and 5; 2 and 4 of P-902A .....closed circuit any two other contacts of P-902A .....open circuit

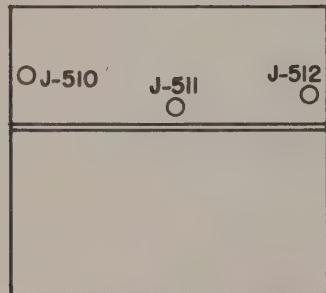
  

<b>RESISTANCE CHECKS.</b>			
<i>Switch Position</i>	<i>Connect Ohmmeter Between Contacts</i>	<i>Correct Indication</i>	
a. S-1301 OFF .....	5 and 6 of P-901A.....	closed circuit	
EMER. S-1302 ON.....	3 and 5, 3 and 6 of P-901A.....	open circuit	
b. Phone in J-1304.....	3 and 4 of P-901A.....	closed circuit (high resist.)	

**Figure 2-3. Inter-Unit Cabling and Control Units Wiring Checks**



RECEIVER - TRANSMITTER UNIT



LOCATION OF DESTRUCTOR JACKS

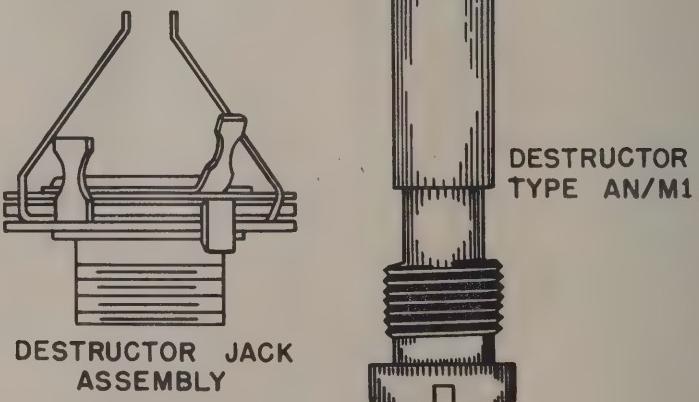


Figure 2-4. AN/APX-1A (-1AX) Destroyors, Location, and Simplified Wiring Diagram

This diagram applies to the 1B installation system, but it is schematically correct (with changes in symbols) for the 2B system.

**b. CHECK THE OPERATION OF THE PILOT'S DESTRUCT SWITCH.**

(1) With the impact switch and DESTRUCT switch in the off position, check for *no voltage* at the "D" plug.

(2) Raise the red guard breaking the safety wire, and throw the DESTRUCT switch to the ON position. Check for *full applied voltage* (approximately 13 or 26 volts depending upon the airplane battery supply).

(3) Return the DESTRUCT switch to the OFF posi-

tion, snap guard over switch and secure with breakable wire.

(4) Check for *no voltage* at the "D" plug.

**c. CHECK THE OPERATION OF THE IMPACT SWITCH.**

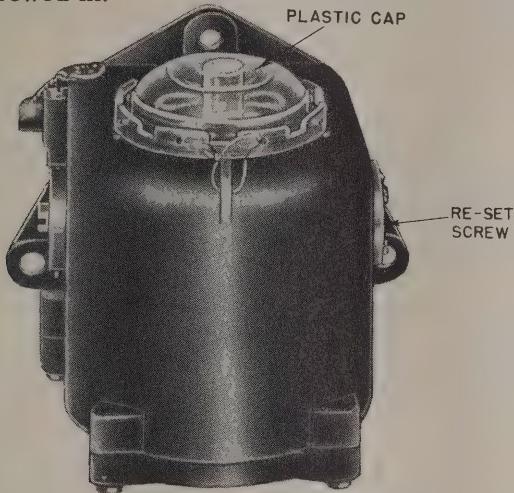
(1) Trip the impact switch in accordance with the directions given in Paragraph 16 below and check for *full applied voltage* at the "D" plug.

(2) Reset the impact switch and check for no voltage at the "D" plug.

**d. CHECK THE RECEIVER-TRANSMITTER.**

(1) Examine the receiver-transmitter for proper installation in its shock mount (including safety wires and grounding jumper).

(2) Ascertain that all the machine screws which hold the covers, wrap-around, and chassis of the receiver-transmitter unit together are in place and tightly screwed in.



**Figure 2-5. Impact Switch Type ★SA-3/A**

(3) Check that all three destructors are in place, tightly screwed in their jacks and that their covers are screwed on tight.

**e. CONNECT THE FIRING CIRCUIT.**

(1) Re-check for no voltage at the "D" plug.

(2) If no defects are noted during these tests, insert the "D" plug in the receptacle J-104.

**16. TRIPPING AND RE-SETTING THE IMPACT SWITCH.**

*(Refer to Figure 2-5)*

**WARNING**

Never trip or check the impact switch while the "D" plug is plugged into J-104 on the receiver-transmitter unit.

a. Trip the impact switch by removing its plastic cap (after first removing the tie-wire) and displacing the pendulum arm until a sharp snap is heard and the pendulum's loose swinging indicates that the switch is tripped (contacts closed).

b. Re-set the impact switch as follows:

(1) Insert a screwdriver blade into the slotted-head (sunken) screw on the right-hand side of the switch casing and rotate the screwdriver counter-clockwise as far as it will go.

(2) Allow the screwdriver to be rotated slowly clockwise by the spring inside until it catches.

(3) The pendulum then will be set firmly and

approximately centered in the opening at the top of the switch casing.

(4) If the impact switch is not in its normal vertical position, it may be necessary to hold the pendulum in place while the screwdriver setting, described in (1) and (2) above, is being made.

c. Check the setting, to ensure that jars and vibration do not trip the switch, by giving the side of the switch casing a hard knock with the hand. The switch should not be tripped.

(1) If the switch should be tripped by this knock test, re-set as described in b. above and repeat the test. If the switch is unable to meet this knock test, it should be removed and replaced.

(2) If additional knock tests indicate a fault that is not corrected by replacement of the switch, poor mounting provisions are indicated and they must be corrected immediately.

d. After the impact switch is properly set and knock-tested, replace the transparent plastic cap and re-fasten the tie-wire if one is used. Check that the cap is screwed on tightly to prevent moisture from entering the interior of the switch.

**17. GENERAL NOTES ON ADJUSTMENTS.**

**WARNING**

The operation of this equipment involves the use of high voltages dangerous to life. Personnel must observe all safety regulations at all times.

During flight, or while the receiver-transmitter unit is installed on its mounting base, do not open the top cover or remove the chassis from the wrap-around.

Immediately after the receiver-transmitter unit is removed from the aircraft for storage, maintenance work, or any other purpose, all three Type AN/M1 Destructors must be removed from the unit and stored in accordance with existing regulations dealing with IFF destructors.

All destructor jacks are wired in parallel. If a single destructor is left in place it will explode whenever voltage is applied to the firing circuit. Be careful, therefore, to remove and count every destructor, and thoroughly recheck all the empty destructor jacks yourself. Never trust anyone else's report.

a. After the installation of the equipment according to the foregoing instructions, it is necessary to make a series of pre-operative checks and tests before the equipment may be put into actual operation. These checks and tests are described in the following paragraphs and the specified procedures must be carefully followed in every detail.

b. If, during these pre-operational tests, the equip-

ment appears to operate abnormally, or if the power supply voltage falls below or rises above its specified limits (*refer to Section II, Paragraph 2, of this handbook*) immediately throw OFF-ON switches S-1301 and F-3 to OFF position. If a preliminary check discloses no apparent reason for the abnormal operation, return the receiver-transmitter unit to the maintenance crew for test and repair (but only after all three Type AN/M1 Destuctors have been removed from the unit and stored in accordance with existing regulations dealing with IFF destructors).

## 18. CHECK THE EQUIPMENT POWER SUPPLY.

a. After all the checks specified in Paragraphs 13 thru 16 above have been made, check the operation of the control switch S-1301 on the control unit. (Up to this point in the test procedure, S-1301 should never have been changed from its OFF position.)

(1) Set the control switch S-1301 to the ON position, leave it there briefly, and return it to the OFF position. While it is in the ON position, make the tests that follow.

(2) Check that the mechanisms (sweep motor and dynamotor) inside the receiver-transmitter unit are heard to start and quickly come up to normal speed, as indicated by the rising and then steady pitch of the sound produced.

(3) If practicable, further check the action of the blower by wetting a finger and holding it beside the louvers on the sides or rear of the receiver-transmitter unit. If the blower is operating, a cold-air intake will be felt at the lower intake opening in the side and a warm-air exhaust will be felt at the upper louvers. The warmth of the latter should increase as the equipment heats up after running for a few moments.

b. If the equipment fails to operate when the above tests are made proceed as follows:

(1) Re-check the fuse H and replace with a good fuse if necessary.

(2) If the fuse is found to be in good condition, yet there is still evidence of a power-supply failure (as indicated in (1) above), thoroughly re-check the inter-unit cabling connections. (*Refer to Figure 4-15 in this handbook.*) Observe particular care in re-checking the power-cable assembly W-905 between the control unit and the aircraft power bus.

(3) If the above checks indicate that the trouble lies in the interior wiring of the control unit, replace the unit with one in good condition. (*Refer to Paragraph 6 above, "Installation of Control and Selector Units."*)

(4) If the above checks indicate that the trouble lies in the receiver-transmitter unit itself, return the unit to the maintenance crew for inspection and repair (but only after all three Destuctors Type AN/M1 have been removed from the unit and stored in accordance with the existing regulations dealing with IFF Destuctors).

(5) When the power-supply circuits have been found to be in good order, make sure that the control switch S-1301 on the control unit (and F-3 on the pilot's remote control panel, if used) is returned to the OFF position. Re-check that the IFF-G switch S-901 and the DESTRUCT switch F-1 are in the OFF position.

## 19. PRE-FLIGHT TEST EQUIPMENT.

a. Pre-flight tests of the AN/APX-1A and AN/APX-1AX equipment are made with the Model IE-46-A (or equivalent) Test Equipment. This equipment includes:

(1) Signal Generator I-196-B.

(2) Frequency Meter BC-906-D.

(3) Radio Receiver BC-1066-B (which is not used in making tests on the Models AN/APX-1A and AN/APX-1AX).

b. For schematic diagrams and detailed information on these units, refer to the two instruction books supplied with the IE-46-A Test Equipment: "Instruction Book for Signal Generator I-196-B and Radio Receiver BC-1066-B", and "Instruction Book for Frequency Meter BC-906-D". A brief description is also given in Section IV, Paragraph 4 of this handbook.

c. The Navy Type CPR-60AAC Test Transmitter and the Navy Type CPR-60AAB Test Receiver may be used in place of the corresponding units of the IE-46-A Test Equipment.

d. It is presumed that testmen will be thoroughly familiar with the IE-46-A test equipment and its proper preparation for use. For reference purposes, however, the recommended preparatory procedure is reviewed in Section IV, Paragraph 5 of this handbook.

e. The test Radio Receiver BC-1066-B is not used in the tests on the receiver-transmitter. Carefully check that it is switched OFF throughout these tests, as its operation will cause serious interference.

## 20. PRE-FLIGHT TESTS—GENERAL PROCEDURES AND PRELIMINARY STEPS.

### WARNING

No pre-flight test procedure should be begun until a complete check has been made of the destructor circuits, as specified in Paragraphs 15 and 16 above.

No pre-flight tests may be performed with the EMERGENCY switch (S-1302 or F-2) in the ON position, or with the selector S-1401 in any position except No. 1, unless the pre-flight tests are performed within an electrically shielded enclosure. Exceptions to this rule may be made only when special authorization is obtained in advance from the Commanding Officer. (*Refer to BuAer CTO No. A-44.*)

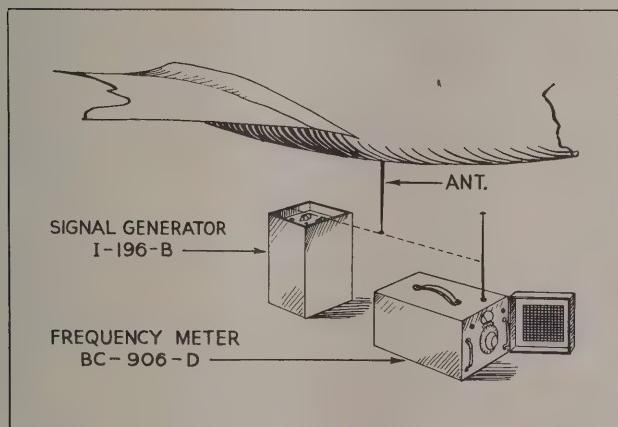
a. DESIGNATED FREQUENCIES.—Information on the specific operating frequencies to be used for

the "G"-band (or Rooster-band) transpondor will be provided by the Commanding Officer.

**b. TEST FAILURES.**—Throughout the pre-flight tests, if a test cannot be completed satisfactorily, if a pre-set frequency cannot be checked within its designated limits, or if a frequency cannot be set as designated, check F-101 and replace with spare fuse F-102. If the equipment still fails to function, report the failure immediately to the Commanding Officer. Or, if previous orders have been issued governing such contingencies, return the receiver-transmitter to the maintenance crew for bench test and readjustment (but only after all three destructors have been removed from the unit).

**c. FOR ALL THESE TESTS.**

(1) The AN/APX-1A (or -1AX) equipment should be turned off (S-1301 and F-3 in the OFF position) or adjusted so that it will not cause interfering signals while checking the frequency of the signal generator against the frequency meter.



**Figure 2-6. Placement of Test Equipment**

(2) Switch S-1301 on the control unit or F-3 on the pilot's remote control switch panel must be ON when making tests on the AN/APX-1A (or -1AX) equipment.

(3) Check that the interior mechanisms are operating (dynamotor and motor running).

(4) Allow at least five minutes for the receiver-transmitter to warm up before making any frequency tests or settings.

**d. PLACEMENT OF THE FREQUENCY METER BC-906-D.**

(1) The placement of the frequency meter is critical and is largely dependent on the type of aircraft in which the AN/APX-1A (or -1AX) equipment to be tested is installed. The frequency meter should be placed so that its own whip-type antenna is not more than five feet from, and is parallel to, the AN/APX-1A antenna.

(2) If the above frequency-meter placement is impracticable, a pickup device must be constructed.

This may be a coaxial cable (such as NAF-47024-107) of sufficient length that one end may be placed within five feet of the AN/APX-1A antenna assembly, while the other end is connected to the antenna connector provided on the frequency meter. On the free (antenna) end of this cable, remove the insulation and shielding for a length of one to three feet. Support the cable so that the unshielded free end is located within five feet of, and parallel to, the AN/APX-1A antenna.

**e. PLACEMENT OF THE SIGNAL GENERATOR I-196-B.**

(1) The placement of the signal generator with relation to the AN/APX-1A antenna is less critical. This signal generator is preferably so placed that the AN/APX-1A antenna is centrally located on a straight line drawn between it and the frequency meter.

(2) Provision must be made, however, for moving the signal generator close to the frequency meter. When the latter is used to calibrate frequency settings on the signal generator extremely close coupling is required.

**f. SIGNAL GENERATOR SETTINGS AND CALIBRATION.**

(Refer to Figures 4-1 and 4-2.)

(1) While the signal-generator frequency setting is being calibrated by means of the frequency meter, the receiver-transmitter should be rendered inoperative or otherwise adjusted so that it will not transmit interfering signals.

(2) To set the signal generator and frequency meter to a designated frequency:

(a) Move the two units close together, throw both the OFF-ON switches to the ON position, and throw the frequency-meter sensitivity switch to the HI position.

(b) Set the frequency meter tuning dial to the designated frequency, referring to the calibration charts provided inside the top cover of the unit.

(c) Rotate and adjust the signal generator tuning knob slowly until a maximum needle dip (minimum reading) is obtained on the frequency-meter microammeter. Rock the tuning knob to ensure that exact resonance is obtained.

**Note**

In this and similar calibrations of the signal generator it is necessary to obtain extremely close coupling between the two units. They must be close enough together so that a distinct needle dip is obtained when the signal generator is tuned to resonance.

(3) After the designated frequency setting has been obtained restore the test units to their recommended pre-flight test locations. (Refer to sub-sections d. and e. above.)

**g. MOVEMENT OF PERSONNEL.**—Personnel should move around as little as possible while pre-flight tests are being made. In particular, testmen

should endeavor to maintain the same position and location while making a meter reading and re-checking a meter reading. The body-capacitance effect of changes in position introduces marked changes in the meter readings obtained.

## 21. PRE-FLIGHT TESTS—GENERAL.

a. TESTS TO BE PERFORMED.—Before the AN/APX-1A (or -1AX) equipment is put into actual operation, make the following tests, using the IE-46-A (or equivalent) Test Equipment.

(1) Check the "go" lower-frequency limit of the "A"-band transpondor.

(2) Check the "no-go" lower-frequency limit of the "A"-band transpondor.

(3) Check the "go" upper-frequency limit of the "A"-band transpondor.

(4) Check the "no-go" upper-frequency limit of the "A"-band transpondor.

(5) Check the operation of the selector switch S-1401 (coded replies) but only if this test is permissible.

(6) Check the EMERGENCY operation (very wide distress pulses), but only if this is permissible.

(7) Set the "G" frequency.

(8) Check "A/G" time-sharing operation and the "G" holding period (10 to 20 seconds).

b. RECOMMENDED PROCEDURES.—The recommended procedures and the required control settings for making these tests are summarized in Figure 2-7 and discussed in more detail, where necessary, in Paragraphs 22 thru 27 inclusive.

(1) The test Radio Receiver BC-1066-B is not used in the tests on the receiver-transmitter. Carefully check that it is switched OFF throughout these tests, as its operation will cause serious interference.

### Note

Information on all frequencies referred to as "designated" will be provided by the Commanding Officer. Throughout the pre-flight tests, if a pre-set frequency cannot be checked within its designated limits, or if a frequency cannot be set as designated, report the failure immediately to the Commanding Officer. Or, if previous orders have been issued governing such contingencies, return the receiver-transmitter unit to the maintenance crew for readjustment (but only after the three destructors have been removed from the unit).

(2) Under reasonably quiet conditions, the tests described above may be made with headphones plugged into the frequency meter PHONE jack. When this is done, signals corresponding with the frequency-meter needle dips may be heard.

### c. AUTHENTICITY OF SIGNAL SOURCE.

(1) If at any time during the tests described

above it is suspected that the signal source of the frequency-meter needle dips is *not* the AN/APX-1A or -1AX receiver-transmitter unit, throw the control switch S-1301 to the OFF position. Check that the frequency-meter needle returns to its no-signal position. If the frequency-meter needle continues to dip, after making this test, it is being actuated by signals from some sources other than the AN/APX-1A (or -1AX) equipment. Check for the operation of nearby AN/APX-1A (or -1AX) or similar equipments. Resume the pre-flight test procedure as soon as the interfering signals have ceased.

(2) If, during these tests, the frequency-meter continues to dip erratically when the signal generator is switched OFF and the equipment control switch S-1301 is ON, there is a possibility that the receiver-transmitter unit may be "squittering," due to noise generated in aircraft or nearby equipment, or to self-oscillation.

(3) The best check for "squittering" is to plug headphones into the PHONES jack J-504 on the upper unit of the receiver-transmitter. An experienced testman can quickly distinguish between the random scratch tones that are the result of electrical noise interference or squittering and the periodic or continuous tone with a definite pitch that is the result of normal operation in response to an authentic signal source.

d. EQUIPMENT FAILS TO OPERATE.—If at any time during these tests the equipment fails to operate check the line fuse H and set fuse F-101 (on panel of lower unit of receiver-transmitter) and replace with a good fuse if necessary. A spare fuse for F-101 will be found in the SPARE receptacle in the lower chassis of the receiver-transmitter unit.

If the unit being tested fails to meet the "go" and "no-go" frequency limits of the "A"-band transpondor, it should be returned to the maintenance crew for readjustment (but only after all three Destructors Type AN/M1 have been removed). The bench readjustment required—re-setting of C-561 and L-524 Adjust.—must not be made during flight or while the receiver-transmitter unit is on its mounting base in the aircraft.

## 22. CHECK THE "GO" AND "NO-GO" LOWER-FREQUENCY LIMITS OF THE "A" BAND.

### a. CHECK "GO" LOWER-FREQUENCY LIMIT.

(1) Set the signal generator and the frequency meter to the lower "go" limit of the "A" band. (Refer to Paragraph 20, sub-section f. of this section.)

(2) Check that the test equipment is placed as specified in Paragraph 20, sub-section d. of this section.

(3) Turn the "A" band of the AN/APX-1A or -1AX equipment ON (S-1301 is ON, and S-901 is OFF).

(4) Check the frequency-meter microammeter needle for greater dipping than maximum obtained

**PRE-FLIGHT RECEIVER-TRANSMITTER TESTS**

<i>Checks and Settings to be Performed</i>	<i>Frequency-Meter BC-906-D</i>	<i>Signal Generator I-196-B</i>	<i>Control Unit C-54/APX-1</i>	<i>Selector Unit and Pilot Remote Switches</i>	<i>Receiver-Transmitter Unit</i>
1. Check "A"-Band "Go" Lower-Frequency Limit	1. Set tuning dial to lower "Go" frequency. 4. Check for small needle-dips occurring regularly every few seconds.	2. Tune "I" band for greatest dip of meter in "grid-dip" frequency-meter	S-1302 OFF (S-1301 OFF) 3. S-1301 ON	(S-1401, Pos. "1")	
2. Check "A"-Band "No-Go" Lower-Frequency Limit	1. Rotate dial <i>slightly</i> clockwise (lowering frequency) until dips cease. 2. Check frequency setting thus obtained (must be no lower than "No-Go" mark).	(as set above)	( S-1301 ON )	(as set above)	
3. Check "A"-Band "Go" Upper-Frequency Limit	2. Set tuning dial to upper "Go" frequency. 5. Check for small needle dips.	3. Tune "I" band for maximum frequency-meter needle dip.	1. S-1301 OFF 4. S-1301 ON	(as set above)	
4. Check "A"-Band "No-Go" Upper-Frequency Limit	1. Rotate dial <i>slightly</i> counter-clockwise (raising frequency) until dips cease. 2. Check frequency setting thus obtained (must be no higher than upper "No-Go" frequency).	(as set above)	( S-1301 ON )	(as set above)	
5. Check "A"-Band Mid-Frequency point	2. Set tuning dial to point half way between upper and lower "Go" frequencies. 5. Check for dip as above.	3. Tune "I" band for maximum frequency-meter needle dip.	1. S-1301 OFF 4. S-1301 ON	(as set above)	
6. Check Selector Switch S-1401 (if permissible)*	3. Check dip characteristics—Refer to Maintenance Handbook.	(as set above)	1. S-1301 ON	(as set above) 2. S-1401 to each position in turn.	
7. Check EMERGENCY Operation (if permissible)*	4. Check dip characteristics—Refer to Maintenance Handbook.	(as set above)	1. S-1301 ON 3. S-1302 EMERG TO ON 5. S-1302 OFF	2. S-1401 to "1"	
8. Set the Designated "G"-Band Frequency	2. Set tuning dial to designated operating "G"-band frequency.  6. Adjust for maximum needle-dips and re-set (if necessary) to exact "G" frequency.	3. Tune "G" band for maximum needle-dip of meter in grid-dip frequency meter. Meter dips will pulsate due to time-sharing with "A" band.	1. S-1301 ON	(as set above) 4. S-901 IFF-G ON	5. Adjust "detent" mechanism O-501 for maximum frequency-meter dips.  7. Re-adjust as above (if necessary) after 6.
9. Check A/G Time-Sharing and "G" Holding	4. Check for rapid needle fluctuations. 6. Check that these dips continue for 10 to 20 seconds after 5, then cease. 8. Check that dips as above occur for 10 to 20 seconds after 7, then cease.	(as set above)	2. S-1301 ON	1. S-1401 to "1" 3. S-901 ON 5. S-901 OFF  7. S-901 TIME for one second, then OFF.	

\* Permissible only when tests are performed in an electrically shielded enclosure, or by specific authorization of the Commanding Officer.

**Figure 2-7. Pre-Flight Receiver-Transmitter Tests**

**Section II****Paragraphs 22-26**

**RESTRICTED**  
**AN 08-30APX1-2**

when calibrating the signal generator. Meter should not give steady reading; needle dips should occur at regular intervals a few seconds apart, and dips should be of constant magnitude.

(5) The above tests cannot be made if fuse F-101 is not in good condition. If this fuse is blown, replace it with spare fuse F-102. If this spare fuse blows, turn the set over to the maintenance crew for a thorough check. Destroy or dispose of the defective fuses.

**b. CHECK "NO-GO" LOWER-FREQUENCY LIMIT.**

(1) With the equipment set up and adjusted as in Paragraph 22, a. above, slowly rotate the tuning dial of the frequency meter a division or two in the clockwise direction, and stop the moment the previously-observed needle dips cease. Readjust the tuning dial very carefully until it is set exactly at or just fractionally beyond the point where the regular needle dips cease.

(2) By means of the calibration charts, determine the exact frequency setting of the frequency meter obtained in sub-section b. (1), above. Check that this frequency lies between the designated "go" and "no-go" lower-frequency limits of the "A" band. (It may be the same as the lower "no-go" limit, but it should not be lower than this limit.)

**23. CHECK THE "GO" AND "NO-GO" UPPER-FREQUENCY LIMITS OF THE "A" BAND.**

**a. CHECK "GO" UPPER-FREQUENCY LIMIT.** —Proceed as in Paragraphs 21 and 22 of this section, except that the test equipment is tuned to the upper "go" frequency limit.

**b. CHECK "NO-GO" UPPER-FREQUENCY LIMIT.**

(1) First set up and operate the equipment on the upper "go" frequency limit.

(2) Slowly rotate the tuning dial of the frequency meter a division or two in the counter-clockwise direction, and stop the moment the previously-observed needle dips cease. Readjust the tuning dial very carefully until it is set exactly at or just fractionally beyond the point where the regular needle dips cease.

(3) By means of the calibration charts, determine the exact frequency setting of the frequency meter obtained in Paragraph 23, b. (2) above. Check that this frequency lies between the designated "go" and "no-go" upper-frequency limits of the "A" band. (It may be the same as the "no-go" upper limit, but it should not be higher than this limit.)

**24. CHECK THE OPERATION OF THE SELECTOR SWITCH S-1401 (If permissible).**

**Note**

The following check may be made only if the test is conducted in an electrically shielded enclosure, or if special authorization has been obtained from the Commanding Officer.

a. Set up and adjust the test equipment to a frequency about half way between the upper and lower "go" limits.

b. Turn equipment ON for "A"-band operation (S-1301 ON).

c. On the selector unit rotate the switch S-1401 to each of its five other positions.

d. At each setting of the selector switch, check the relative amplitude of the observed frequency-meter needle dips. Check these observations with information supplied by the Commanding Officer or by reference to the "Handbook of Maintenance Instructions for the Models AN/APX-1A and AN/APX-1AX Equipment".

e. At the conclusion of this test return the selector switch S-1401 to position "1".

**25. CHECK EMERGENCY OPERATION (If permissible).**

**Note**

The following check may be made *only* if the test is conducted in an electrically shielded enclosure, or if special authorization has been obtained from the Commanding Officer.

a. Set-up and adjust the test equipment to a mid-frequency in the "A" band (same as used in Paragraph 24, a. above).

b. On the control unit throw the OFF-ON switch S-1301 to the ON position, tilt up the green EMERGENCY guard and throw the switch S-1302 to the ON position.

c. Check the observed frequency-meter needle dips with information supplied by the Commanding Officer or by reference to the "Handbook of Maintenance Instructions for the Models AN/APX-1A or AN/APX-1AX Equipment."

d. At the conclusion of this test, throw the OFF-ON and EMERGENCY switches to the OFF position. Check that the guard cover for the emergency switch is securely fastened down with a breakable safety wire passing thru the holes in the end of the guard and in the head of the screw immediately below it.

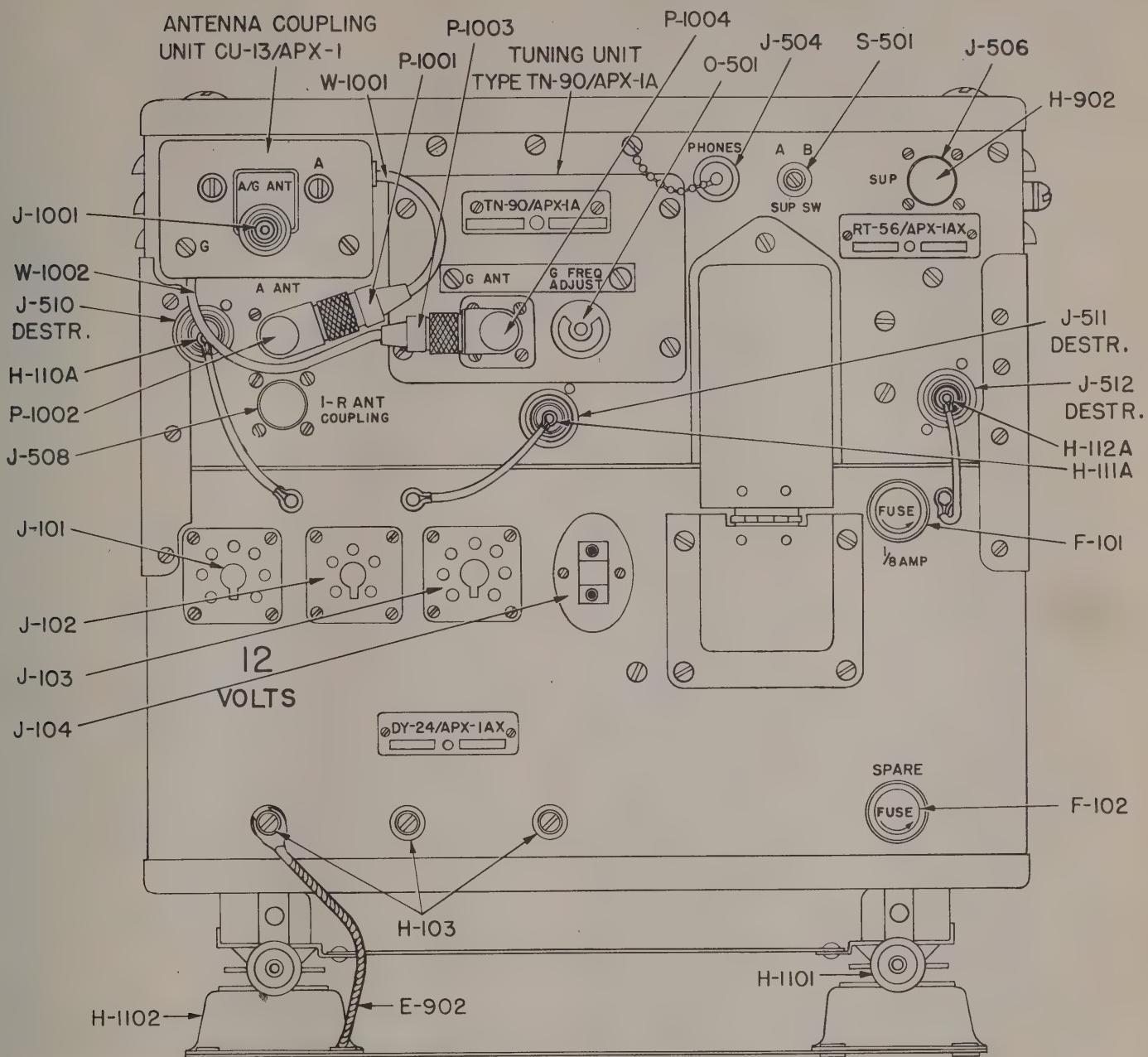
**26. SET THE DESIGNATED "G" BAND FREQUENCY.**

a. Set the signal generator and the frequency meter to the designated "G" frequency. (*Refer to Paragraph 20, sub-section f. of this section.*)

b. On the control unit throw switch S-1301 ON, and on the IFF-G unit throw switch S-901 to the ON position.

c. On the receiver-transmitter unit locate the detent mechanism O-501, which projects from the center of the upper front panel under the legend G FREQ ADJUST. (*Refer to Figure 2-8.*)

d. By means of a screwdriver, adjust O-501 slowly until the "G" frequency is set so as to obtain maximum needle dip on the frequency-meter microam-



**Figure 2-8. Receiver-Transmitter Unit Type RT-23A/APX-1X, Panel Controls**

This drawing with appropriate changes in name plates and addition of receptacle J-105 is applicable to the Receiver-Transmitter Type RT-22A/APX-1.

meter. This adjustment must be made very slowly as the "G" band is time sharing with the "A" band, causing the needle to dip at frequent intervals. See Note below. The "G" frequency is raised as the adjustment screw is rotated in the clockwise direction. Rotation from one detent notch to the next shifts the frequency approximately one-fourth megacycle.

**Note**

This adjustment may be facilitated by plugging headphones into the PHONES jack J-504 on the upper panel of the receiver-transmitter and getting a rough "G" frequency adjustment by setting O-501 about halfway between the two points at which a steady tone in the headphones begins and ends. After this rough setting is made, remove the headphones and adjust O-501 carefully for maximum frequency-meter needle dip as described above.

- e. Peak the frequency meter to make certain that it is tuned for maximum dip. After peaking, check the frequency, and readjust the signal generator and the G FREQ ADJUST, if necessary, until the "G" frequency is accurately set.

**27. CHECK "A/G" TIME SHARING AND "G" HOLDING.**

- a. The OFF-ON switch S-1301 and the IFF-G switch S-901 should both be in the ON position. The signal generator and frequency meter should be left unchanged from the setting used in adjusting the "G" frequency. (Refer to Paragraph 26 above.)

b. Check that the frequency-meter needle now fluctuates rapidly.

c. Return the "G"-band switch S-901 to the OFF position. Check that the frequency meter's rapid needle fluctuations continue for not less than ten and not more than twenty seconds after the "G"-band switch has been thrown to the OFF position.

d. Check that at the end of the holding interval described in c. above, the frequency-meter needle returns to its no-signal (no-dip, maximum-reading) position and remains there.

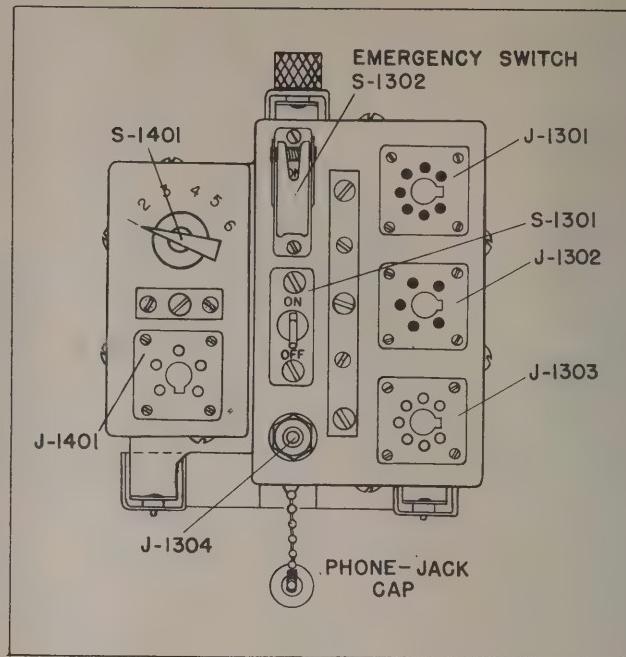
e. Flip the "G"-band switch S-901 to the TIME position, hold it there for at least half a second, and allow it to fly back to the OFF position.

f. Check the re-occurrence of the rapid needle fluctuations described in b. above. Check that they continue for not less than ten nor more than twenty seconds, and then cease, as in c. and d. above.

**28. ADJUSTMENT CLASSIFICATION OF AN/APX-1A AND AN/APX-1AX CONTROLS.**

a. Some of the AN/APX-1A and AN/APX-1AX controls are pre-set by the maintenance crew and must not be readjusted in actual operation.

b. Other controls are pre-set to designated positions for use of the equipment in a particular aircraft and



**Figure 2-9. Selector and Control Units, Panel Controls**

with specific associated equipment. These controls are not intended to be readjusted in actual operation.

c. The remaining controls may be readjusted in actual operation for specific tactical purposes and for optimum performance of the equipment.

d. The following three paragraphs list the various AN/APX-1A (same for AN/APX-1AX) controls and specify by whose authority each is set and under what circumstances each may be readjusted during flight (if such readjustment is permissible). This list should be carefully studied and memorized.

**29. USE OF CONTROLS WHEN USING IFF-G SWITCH.**

(Refer to Figures 2-9 and 4-15.)

a. OFF-ON SWITCH S-1301 (or separate pilot's remote switch F-3).—This switch is used by the pilot to put the entire equipment into operation. Normal "A"-band operation will result.

b. SELECTOR UNIT SWITCH S-1401.—This switch is left in position "1" at all times, except when authorized to use one of the five other positions. Pilots will be governed by official regulations dealing with the operation of the selector switch in IFF equipment, and by specific instructions from BuAer or the Commanding Officer.

c. IFF-G SWITCH S-901.—This switch is normally left in the center or OFF position. It may be thrown ON or flipped to the TIME position at the discretion of the pilot and in conformity with specific orders governing the use of the "G" band.

d. EMERGENCY SWITCH S-1302 OR F-2.—The EMERGENCY switch S-1302 on the control unit (or

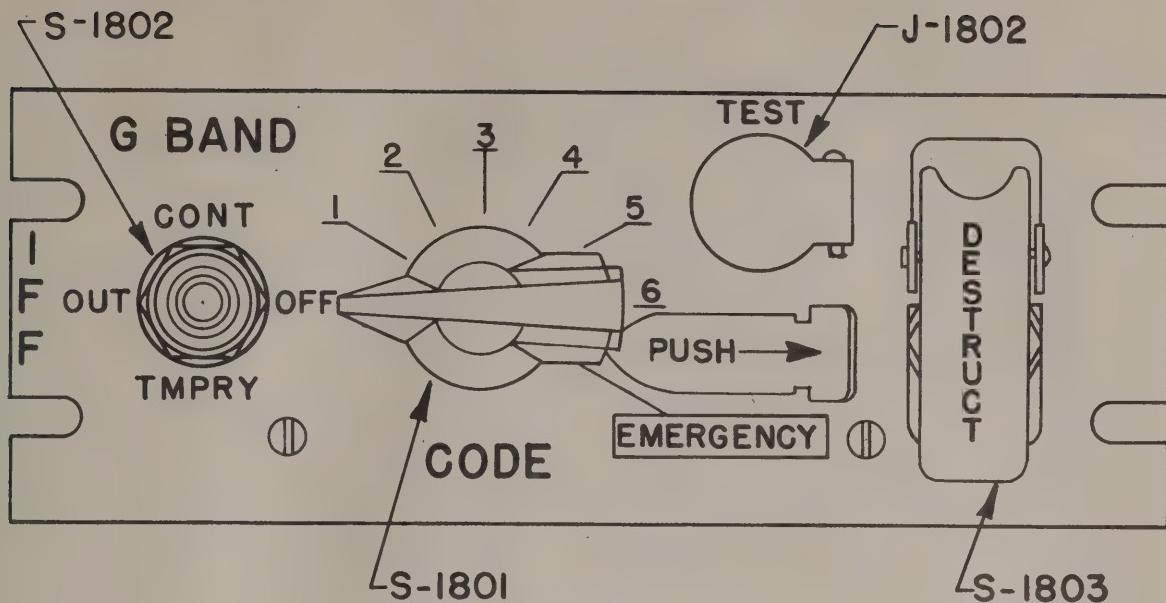


Figure 2-10. Console Control Unit, Panel Controls

F-2 on the pilot's remote switch panel) is never snapped ON except when the aircraft, during flight, is in extreme distress. Pilots will be governed by existing regulations dealing with emergency operation of IFF equipment.

e. DESTRUCT SWITCH F-1.—This switch is always left in the OFF position and protected from accidental readjustment by the closed red guard cover. The pilot may raise the red guard cover and throw the DESTRUCT switch ON only when it is necessary to destroy the interior components of the receiver-transmitter unit to prevent the equipment's falling into enemy hands. Pilots will be governed by existing regulations dealing with the destruction of IFF equipment.

### 30. CONTROLS OF THE RECEIVER-TRANSMITTER UNIT TYPE RT-22A/APX-1 OR RT-23A/APX-1X.

(Refer to Figure 2-8.)

a. SUP SWITCH S-501.—This screwdriver adjustment controls a switch which is normally left in the "A" position and locked. This should not be altered during operation.

b. G FREQ ADJUST O-501.—This screwdriver-adjustment detent mechanism is set for a designated operating "G" frequency in the pre-flight test procedure. (Refer to Figure 2-7.) It is not intended to be readjusted during actual operation.

c. ADDITIONAL CONTROLS.—There are two additional controls for the upper unit of the receiver-transmitter (not shown in Figure 2-8). These are accessible only thru holes, which are protected by dust covers, in the wrap-around of the receiver-trans-

mitter. These controls are not used in pre-flight testing or in actual operation, and they should be used only by maintenance personnel.

### 31. CONSOLE CONTROL-2B SYSTEM.

a. When using the Console Control Unit Type C-119/APX the installation should conform with the pictorial diagram of Figure 4-16. The schematic diagram is shown in Figure 4-14, and the inter-unit connections are shown in Figure 4-9. This control unit replaces the Control Unit Type C-54/APX-1, the Selector Unit C-55/APX-1, the IFF-G switch S-901 and the pilot's remote control switches shown in Figure 4-15.

b. Instructions given elsewhere in this handbook for testing or operating the equipment still apply, although the details regarding the references to the controls must be modified remembering the differences as noted below.

c. Functions of the OFF-ON switch S-1301 or F-3, the EMERGENCY switch S-1302 or F-2, and the Selector switch S-1401 are all incorporated in the CODE switch S-1801. The set is turned on by rotating the CODE switch S-1801 to position "1". (It remains "on" in any of the other CODE switch positions except OFF.) EMERGENCY operation is obtained in the last (clockwise) position of the CODE switch.

The IFF-G switch S-901 is replaced by the G BAND switch S-1802. The DESTRUCT switch F-1 is replaced by a similar DESTRUCT switch S-1803 mounted on the console control unit. The TEST jack J-1802 replaces the PHONES jack J-1301 of the Control Unit Type C-54/APX-1.

## MODES OF OPERATION

**GENERAL:** Selector switch S-1401 should be moved from position "1" *only* when directed to do so by the Commanding Officer.

PARTICULAR ADJUSTMENTS		Control Unit		"G"-Band Unit
<i>Modes of Operation</i>	<i>Selector Unit Switch S-1401</i>	OFF-ON S-1301 (or F-3)	EMERGENCY S-1302 (or F-2)	
I. "A" Band Only	Position "1" or as directed	ON	OFF	"off"
II. "G"-Band Time Sharing with "A" Band	Position "1" or as directed	ON	OFF	ON TIME*
III. "Emergency" "A"-Band Operation Only	Position "1" or as directed	ON	ON	"off"
IV. "Emergency" "A"-Band Emergency Time-Sharing with Normal "G"-Band Operation	Position "1" or as directed	ON	ON	ON TIME*

\* Flipping "G"-Band switch to the TIME position and allowing it to fly back to "off" initiates a ten- to twenty-second period of "G"-Band operation (time-sharing with the "A" Band).

TO DESTROY: Warn Personnel.....Lift Red Guard.....Throw Switch F-1 ON

TO SECURE: All Switches OFF.....Remove R-T Unit from Mounting Base (refer to Section II, Paragraph 5, b.).....Remove Destructors—Following Regulations.

**Figure 3-0. Modes of Operation**

## **SECTION III**

### **OPERATION**

#### **1. PRECAUTIONS TO BE OBSERVED.**

a. Operators of the AN/APX-1A and -1AX equipment must be thoroughly familiar with the equipment's controls.

(1) They must know that the following controls are pre-set by the maintenance crew and must not be readjusted during actual operation: "A"-band trimmer capacitor C-561 and L-524 adjustment.

(2) They must know that the following controls are pre-set by the maintenance crew or by the service-installation crew in the pre-flight tests and it is not intended that these controls be readjusted during actual operation: SUP SWITCH S-501, G FREQ ADJUST O-501.

(3) They must know that the following controls may be readjusted during actual operation in conformity with tactical uses of the equipment and to obtain optimum performance: OFF-ON switch S-1301 or F-3, "G"-band switch S-901, DESTRUCT switch, F-1 and selector switch S-1401.

b. Before actual operation is begun, take the following special precautions.

(1) Check that a complete destructor-circuit test has been performed in accordance with the instructions given in Section II, Paragraph 15, of this handbook.

(2) When Type AN/M1 Destroyors are installed in the receiver-transmitter unit, check that all three destroyors are firmly screwed into their respective destructor jacks. (*Refer to Figure 2-4.*)

(3) On the control unit check that the EMERGENCY switches S-1302 and F-2 are off and the guard down.

(4) On the pilot's remote switch panel check that the red guard cover is closed down over the DESTRUCT switch F-1 and secured with safety wire.

(5) On the selector unit check that the selector switch S-1401 is set in position "1", unless some other setting has been specifically designated by the Commanding Officer.

c. After operation is completed, take the following special precautions.

(1) The OFF-ON switches S-1301 and F-3 are set to the OFF position.

(2) If the receiver-transmitter unit is removed from its mounting base, check that all three Destroyors Type AN/M1 are removed immediately from their respective destructor jacks and stored in accord-

ance with existing regulations dealing with IFF destructors.

#### **2. ABBREVIATED OPERATING PROCEDURE.**

(*Refer to Figures 2-8, 2-9, and 3-1.*)

a. TO START THE EQUIPMENT.—Switch S-1301 in the control unit (or F-3 on pilot's remote switch panel) is thrown ON.

b. TO CHANGE SELECTOR SWITCH POSITIONS.—On the selector unit rotate the switch S-1401 to the position designated by the Commanding Officer. Unless otherwise directed S-1401 is set and left in position "1".

c. TO OPERATE THE "G"-BAND.—On the pilot's remote-switch panel throw the "G"-band switch S-901 to the ON position or flip it to the TIME position.

d. FOR DISTRESS OPERATION.—On the control unit or the pilot's remote switch panel, lift the green EMERGENCY guard and throw the switch ON.

e. TO DESTROY THE RECEIVER-TRANSMITTER UNIT.—If possible, warn operating personnel to stand clear of the receiver-transmitter unit. On the pilot's remote-switch panel raise the red guard cover and throw the DESTRUCT switch F-1 to the ON position. This will explode all three Type AN/M1 Destroyors in the unit.

f. FURTHER OPERATING PROCEDURES.—Information on further operation procedures must be obtained from the Commanding Officer.

g. TO STOP THE EQUIPMENT.—On the control unit throw the switch S-1301 (and F-3, if used) to the OFF position.

#### **3. OPERATING PROCEDURE WHEN EQUIPPED WITH CONSOLE CONTROL UNIT.**

a. Operation of the equipment is basically like that described earlier for the control shown in Figure 2-9. There are however, certain manipulative differences noted below.

b. TO TURN EQUIPMENT ON.—Rotate the CODE switch S-1801 to position "1". Leave the CODE switch in position "1" at all times when operating the equipment unless directed to use one of the other CODE positions. (G BAND switch in OUT position.)

c. TO OPERATE THE "G" BAND.—Turn the CODE switch S-1801 to position "1". Get the G BAND switch S-1802 to CONT (continuous) or hold it momentarily in the TMPRY (temporary) position.

**d. FOR DISTRESS OPERATION.**—Push the guard latch H-1801 to tilt it up and rotate the CODE switch S-1801 to the EMERGENCY (extreme clockwise) position.

**e. TO DESTROY THE RECEIVER-TRANSMITTER UNIT.**—Raise the red guard cover H-1802 breaking the safety wire, and throw the DESTRUCT switch S-1803 to the ON position.

**f. TO STOP THE EQUIPMENT.**—Rotate the CODE switch S-1801 to its extreme counter-clockwise OFF position.

**4. TO SECURE EQUIPMENT AFTER USE.**

**a.** Check that all switches are OFF.

**b.** Remove the receiver-transmitter from its mounting base and from the aircraft (*refer to Section II, Paragraph 5, b.*)

**c.** Immediately upon removal of the receiver-transmitter from the aircraft all three destructors are to be removed, handled and stored in complete accordance with existing regulations.

**WARNING**

Count the destructors carefully and re-check the destructor jacks to make absolutely certain that no destructor is accidentally left in its jack in the receiver-transmitter unit. Do not trust anyone else's report that all the destructors have been removed, but make sure of that fact for yourself.

**d.** The receiver-transmitter unit then may be stored in accordance with existing regulations governing the storage of IFF equipment.

## **SECTION IV**

### **SUPPLEMENTARY DATA**

#### **1. GENERAL.**

In some installations the SUP input jack in the upper right corner may be used. This is designed to take a single-conductor cable thru a plug Type 49192. The method of assembling this plug to the cable is the same as that described in Section II, Paragraph 12 and illustrated in Figure 4-12. The opposite end of this cable is made to fit other associated apparatus and the termination here depends on the equipment used. If the plug to be used is Navy Type 47847-1 (British 10H/701) it can be assembled as in Figure 4-13 and must be attached to the SUP jack thru a coaxial plug adapter, E-901, as listed in the Accessory Table in Section I.

Details on the use of this SUP jack are discussed in the Maintenance Handbook.

The use of the Auxiliary Control Type C-53/APX-1 is also covered in the Maintenance Handbook.

#### **2. USE OF AN/APX-1A (OR AN/APX-1AX) CONTROLS AND CABLING WITH CERTAIN RECEIVER-TRANSMITTER UNITS OF OTHER IFF EQUIPMENT.**

a. The mounting base and control units of the AN/APX-1A and -1AX equipment are so designed that they can be used to mount and operate receiver-transmitter units of the Navy Model ABK series (Army Radio Set SCR-595), Army Radio Set SCR-695 (Navy ABF series), British Mark III, and British Mark III G/R with exceptions and under conditions noted below.

Interchangeability is possible as noted below only between models designed to operate from the same nominal power supply voltage.

(1) Complete control is possible of the receiver-transmitter units in the Navy Model ABK series (Army Radio Set SCR-595), and British Mark III. The "G"-band control unit of the AN/APX-1A or -1AX equipment cannot be used.

(2) Complete control of Army Radio Set SCR-695-A or -AZ (Navy Models ABF-1 and ABF) including "G"-band operation is possible.

(3) Complete control of the British Mark III G/R is possible only if pins 5 and 6 of plug P-903A are connected together. This jumpered connection is not required to operate other equipment.

#### **3. USING RECEIVER-TRANSMITTER TYPE RT-22A/APX-1 OR RT-23A/APX-1X IN CRAFT EQUIPPED WITH CONTROLS OF OTHER IFF EQUIPMENT.**

a. Receiver-transmitters of the Models AN/APX-1A and -1AX equipment can be mounted in, and operated from the controls in craft equipped for Navy Model ABK (Army Radio Set SCR-595), Army Radio Set SCR-695 (Navy Model ABF), British Mark III or Mark III G/R, Model AN/APX-2, and Model AN/APX-2A equipment under the following conditions:

(1) Power supply voltages must be nominally alike.

(2) NAVY MODEL ABK series, ARMY RADIO SET SCR-595, or BRITISH MARK III.—"A"-band operation only is possible unless a separate "G"-band switch, cable, and plug are assembled. Control of the "A" band is possible *only* if a seven-pin male plug NAF-68925-2, having a jumper between pins 4 and 7, is inserted in jack J-103 of the lower unit.

(3) The antenna rod used in the ABK Series antenna is not suitable for use with the AN/APX-1A or AN/APX-1AX and will therefore have to be changed. The antenna rod supplied with the AN/APX-1A or AN/APX-1AX will fit in the same base used in the ABK installation.

(4) ARMY RADIO SET SCR-695-A or -AZ.—"A" and "G"-band operation will be possible if the plug inserted in J-103 is provided with a jumper between pins 4 and 7.

(5) BRITISH MARK III G/R.—Complete control of all functions is possible.

(6) MODEL AN/APX-2 AND MODEL AN/APX-2A.—Complete control of all functions is possible.

(a) Receptacle J-105 is used with the Model AN/APX-2 and Model AN/APX-2A controls.

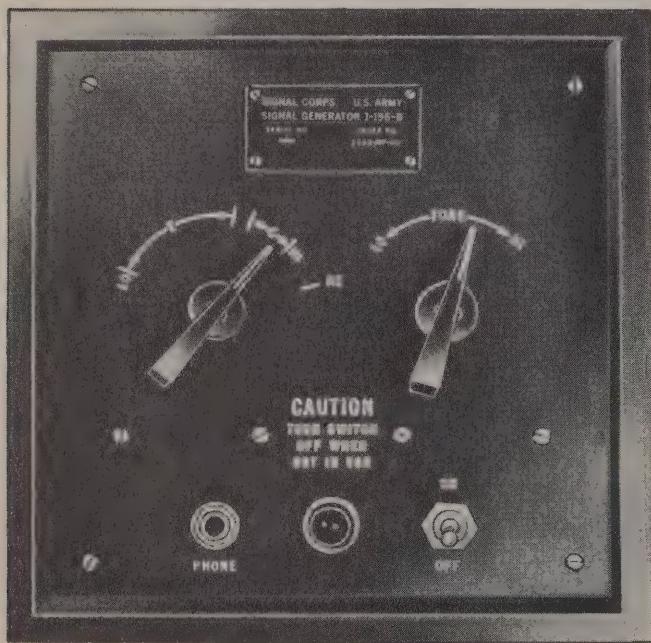
(b) The three-ampere d-c fuse F-302 in the Operator Control Unit Type C-56/APX-2 must be replaced with a 20-ampere fuse. Dummy plugs should be placed in jacks J-101, J-102, and J-103 to protect the exposed contacts from possible short circuits or grounds.

**4. PRE-FLIGHT TEST EQUIPMENT IE-46-A—  
DESCRIPTION.**

**a. SIGNAL GENERATOR I-196-B.**

(1) The signal generator is a self-pulsing radio-frequency oscillator, the oscillation frequency of which may be changed by means of a variable capacitor to obtain complete coverage of the "A" (alternatively designated as the "I") and the "G" frequency bands. The pulse rate may be varied by means of a rheostat and can be heard in headphones plugged into the PHONE jack.

(2) The signal-generator panel is shown in Figure 4-1. The tuning-knob scale is marked at the higher and lower limits of both the "I" (or "A") and "G" bands. The quenching-frequency control is labeled TONE. There is also an OFF-ON switch, a PHONE jack, and a pilot light.



**Figure 4-1. Signal Generator I-196-B**

**b. FREQUENCY METER BC-906-D.**

(1) The frequency meter is an absorption-type meter that provides full coverage of both the "I" (or "A") and "G" bands. A dip in the frequency-meter microammeter needle indicates resonance. Two degrees of sensitivity are provided by a double-pole, double-throw switch. The length of the frequency meter's antenna may be adjusted for maximum sensitivity.

(2) The frequency-meter panel is shown in Figure 4-2. The tuning dial is calibrated arbitrarily and calibration charts are provided in the meter cover. In addition, there is a 500-microampere d-c meter, an OFF-ON switch, a sensitivity-selector switch labeled HI-LO, a PHONE jack, a concentric high-frequency connector (British type), a plug-in telescopic antenna,



**Figure 4-2. Frequency Meter BC-906-D**

and a push-button interlock switch that automatically turns off the power when the cover of the frequency meter is closed.

**c. TEST EQUIPMENT POWER SUPPLIES.**—Each of the two units of the Test Equipment IE-46-A used for the pre-flight tests described in Section II is individually powered by dry cells contained within the cases.

**5. PREPARATION OF TEST EQUIPMENT IE-46-A.**

**a. GENERAL.**—Before making any of the pre-flight tests specified in Section II, Paragraphs 21 thru 27 inclusive, of this handbook, prepare the test equipment in accordance with the following directions. If further details are required, refer to the two instruction books supplied with the IE-46-A Test Equipment: "Instruction Book for Signal Generator I-196-B and Radio Receiver BC-1066-B" and "Instruction Book of Frequency Meter BC-906-D".

**b. PREPARATION OF THE SIGNAL GENERATOR I-196-B.**

(Refer to Figure 4-1.)

- (1) Throw the OFF-ON switch to the ON position.
- (2) Plug headphones into the PHONE jack and listen for the characteristic tone that indicates the signal generator is operating.

(3) Adjust the TONE control to obtain a tone of approximately 600 cycles per second. (This tone will change somewhat as the position of the tuning knob is changed.)

(4) Set the tuning knob to a position midway between the HI and LO limits of the "I" band.

**Note**

The "I" band and "A" band are alternative, interchangeable designations for the same frequency band.

**c. PREPARATION OF THE FREQUENCY METER BC-906-D.**

*(Refer to Figure 4-2.)*

(1) Throw the OFF-ON switch to the ON position and the sensitivity switch to the HI position.

(2) Remove the telescopic antenna from its clamp inside the meter cover and insert it thru the hole provided in the top of the instrument case so that the antenna base is firmly plugged into its socket. Place the frequency meter so that the panel faces upward and the antenna projects horizontally.

(3) Using the calibration charts provided, set the frequency-meter tuning dial two megacycles below the low-frequency end of the "I" (or "A") band.

(4) Place the frequency meter close to the signal generator.

(5) Plug phones in the PHONE jack and rotate the "I"-band (or "A"-band) tuning dial until the 600 c.p.s. tone of the signal generator is heard in the headphones. Move the frequency meter close enough to the signal generator so that the frequency-meter needle will dip when the signal generator tone is heard in the headphones.

(6) Check that the frequency meter is tuned to the signal generator (rather than to some other signal source) by varying the TONE control or by momentarily switching the signal generator OFF. In the first case, check that the pitch of the tone heard is varied, and in the second case, that the signal is no longer heard in the headphones.

(7) Repeat the tuning procedure described in sub-section (5) above with several different signal-generator settings to check that the equipment operates satisfactorily between the HI and LO tuning positions of the "I" (or "A") band of the signal generator.

(8) Tune the signal generator to the midpoint of the "G" band and follow the same procedure described in sub-sections (5) and (6) above as when testing the "I" (or "A") band.

**Note**

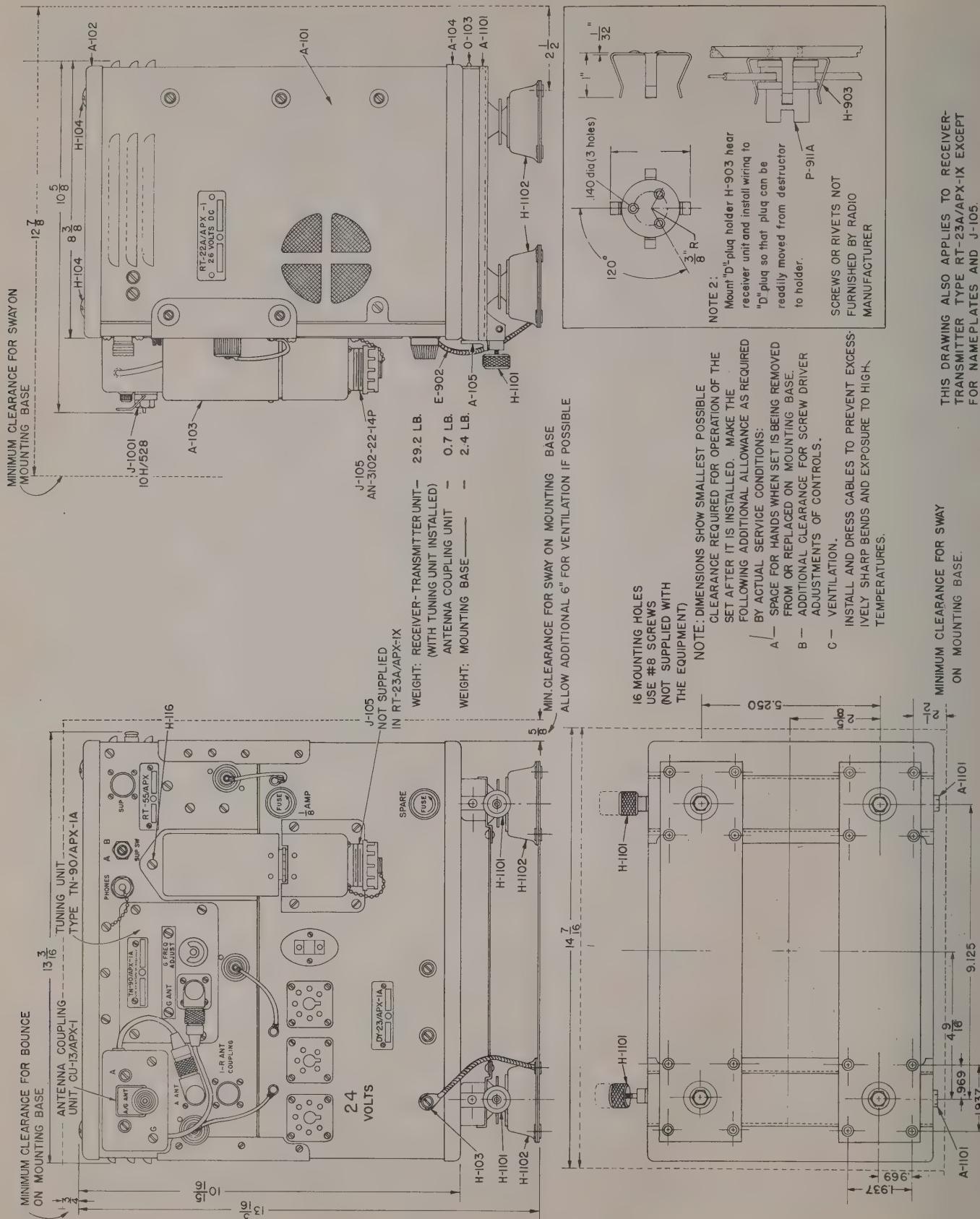
There may be a background tone over all or part of either band. The desired signal tone is considerably louder than this background tone, however, and it may be sharply tuned.

**d. DESIGNATED FREQUENCIES.**—The designated lower and upper frequency limits of the "I" (or "A" band) and the "G" band may be obtained from the Commanding Officer.

**e. ABNORMAL OPERATION OF THE TEST EQUIPMENT.**—If the test equipment does not appear to operate normally when it is being prepared for use in accordance with the above procedures, check the batteries, tubes, and other components as necessary. For schematic diagrams and detailed information, refer to the instruction books supplied with the test equipment.

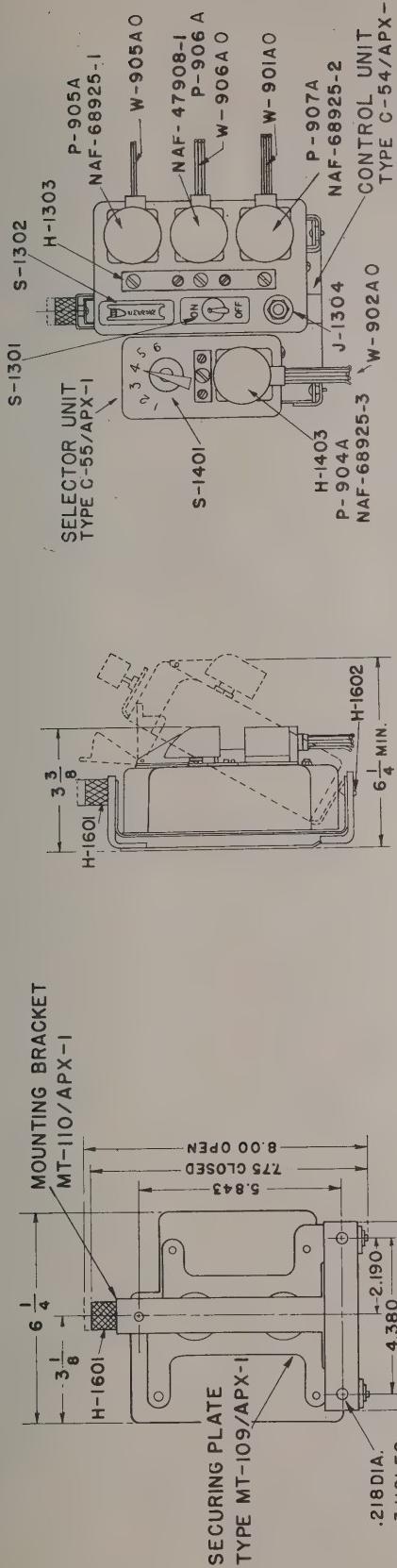
Section IV

**RESTRICTED**  
AN 08-30APX1-2



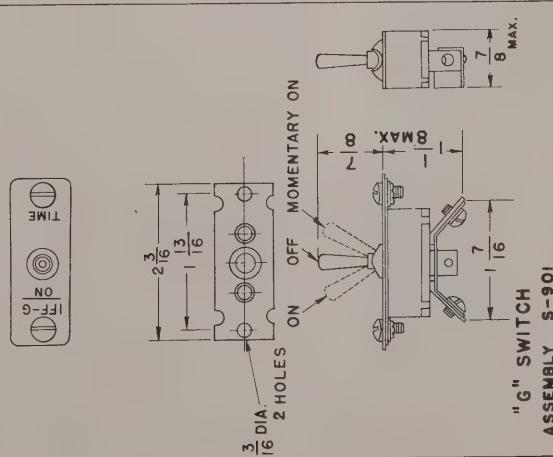
**Figure 4-3.** Installation Diagram, Receiver-Transmitter Unit and Mounting Base

**RESTRICTED**  
**AN 08-30APX1-2**



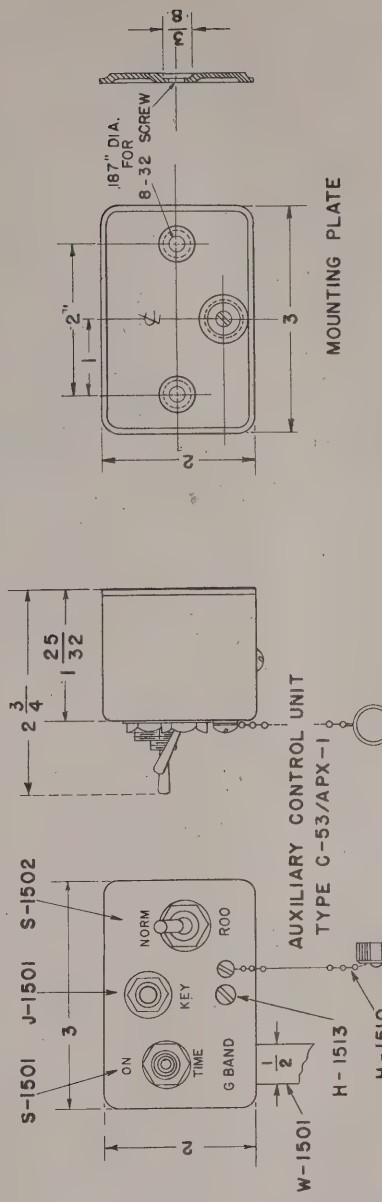
NOTE: DISTANCE SHOWN IS THE MINIMUM NECESSARY FOR REMOVAL OF UNIT.

MAKE ADDITIONAL ALLOWANCES FOR EASIER REMOVAL, FOR  
ACCESS TO CONTROLS DURING FLIGHT, AND FOR OTHER SERVICE  
REQUIREMENTS



NOTE: "G" SWITCH ORDINARILY USED. AUXILIARY CONTROL UNIT AND ITS  
CABLE NOT ASSEMBLED FOR USE UNLESS SPECIFICALLY INSTRUCTED.

WEIGHT - SELECTOR UNIT — 0.5 LBS. (LESS PLUG & CABLE)  
WEIGHT - CONTROL UNIT — 1.1 LBS. (LESS PLUGS & CABLES)  
WEIGHT - MOUNTING BRACKET — 0.4 LBS.  
WEIGHT - SECURING PLATE 0.4 LBS.  
WEIGHT - AUXILIARY CONTROL UNIT 0.3 LBS. (LESS CABLE)  
WEIGHT - "G" SWITCH ASSEMBLY — 0.09 LBS.



(INCLUDES SELECTOR UNIT TYPE C-55/APX-1, AUXILIARY  
CONTROL UNIT TYPE C-53/APX-1, "G" SWITCH ASSEMBLY,  
MOUNTING BRACKET TYPE MT-110/APX-1, AND SECURING  
PLATE TYPE MT-109/APX-1)

CONTROLS, INSTALLATION DIAGRAM

Figure 4-4. Controls, Installation Diagram

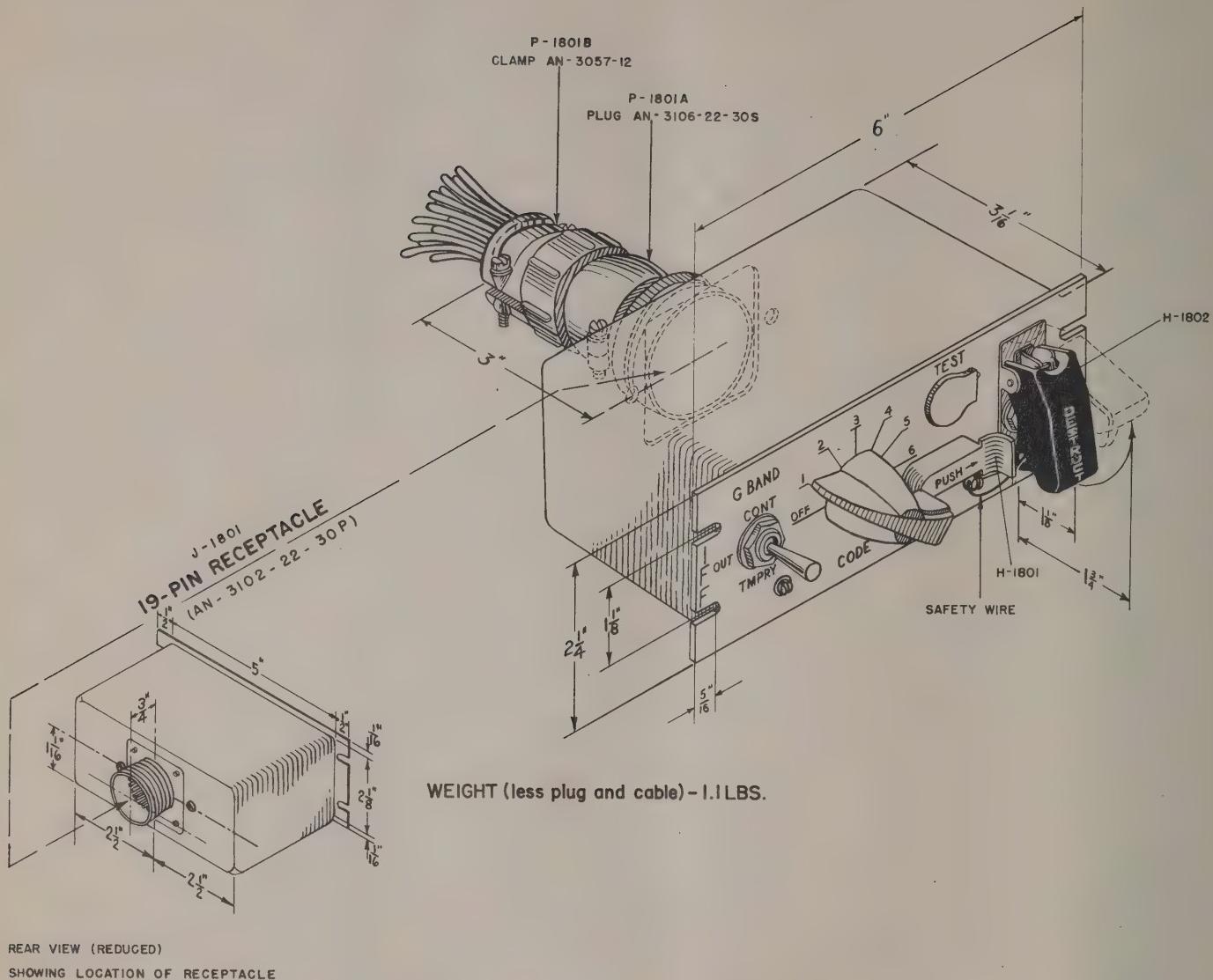


Figure 4-5. Console Control Unit, Installation Diagram

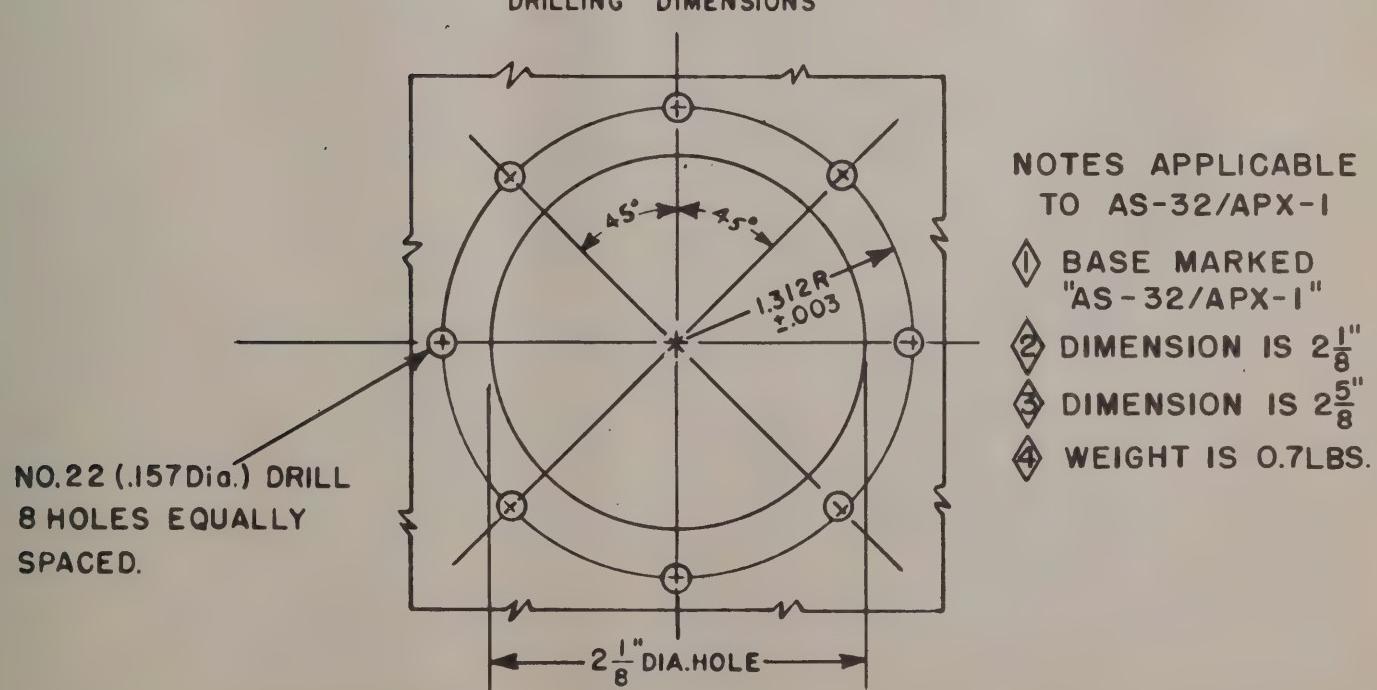
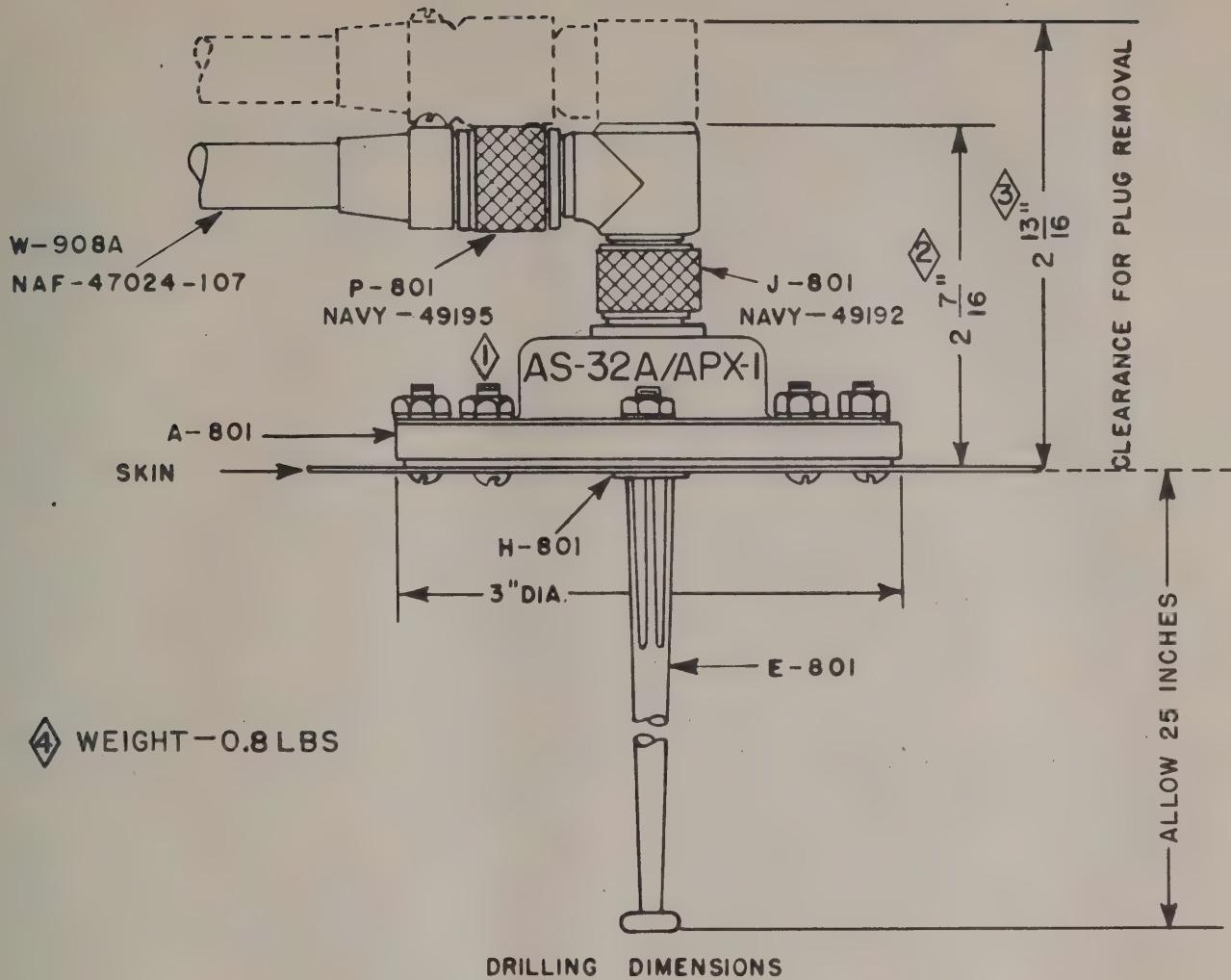
RESTRICTED  
AN 08-30APX1-2

Figure 4-6. Antenna Assembly Type AS-32A/APX-1 (or AS-32/APX-1), Installation Diagram

RESTRICTED

## RECEIVER - TRANSMITTER (LOWER UNIT)

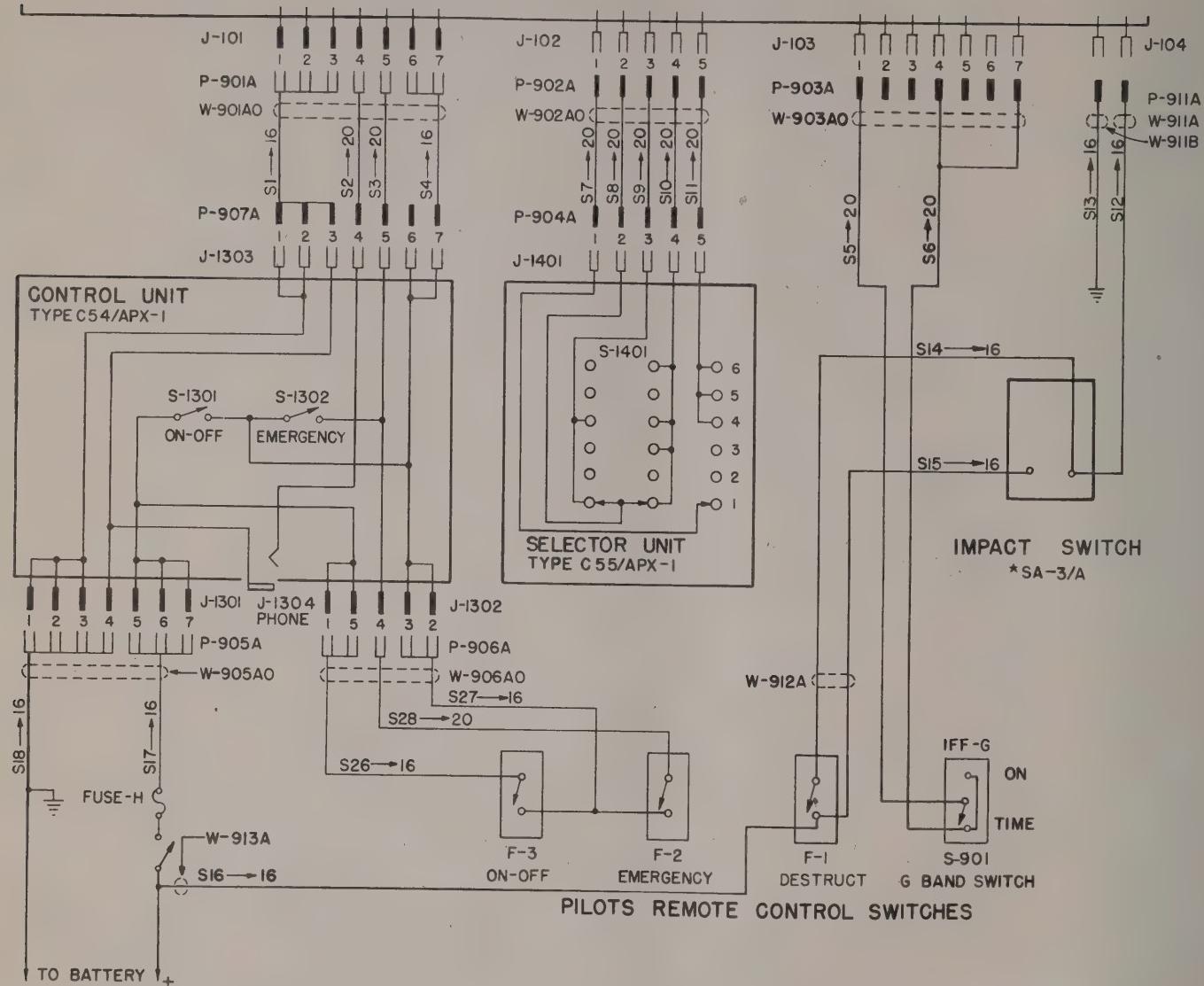
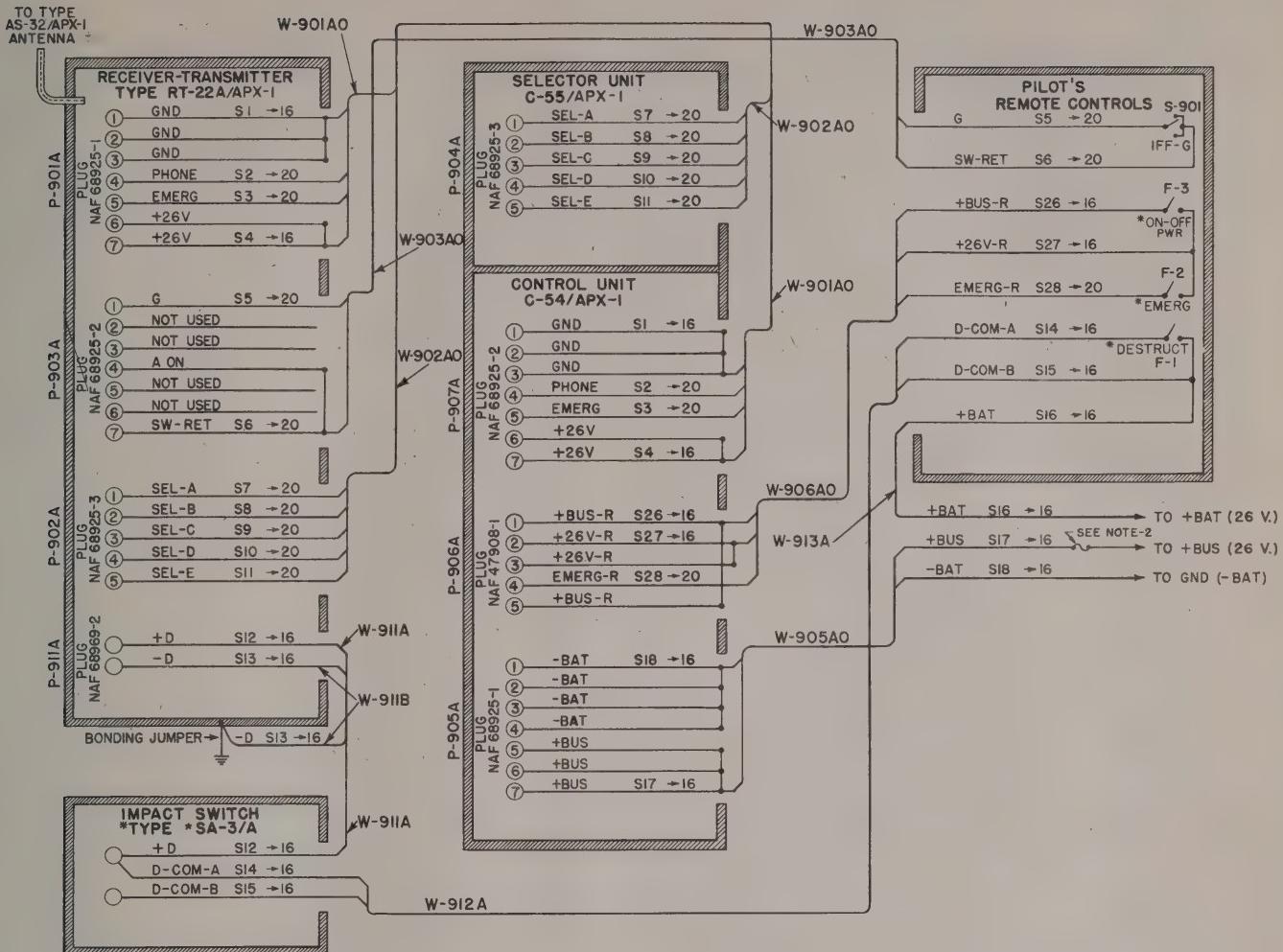


Figure 4-7. Inter-Unit Cabling and Control Units, Wiring Diagram (1B) System



#### NOTE

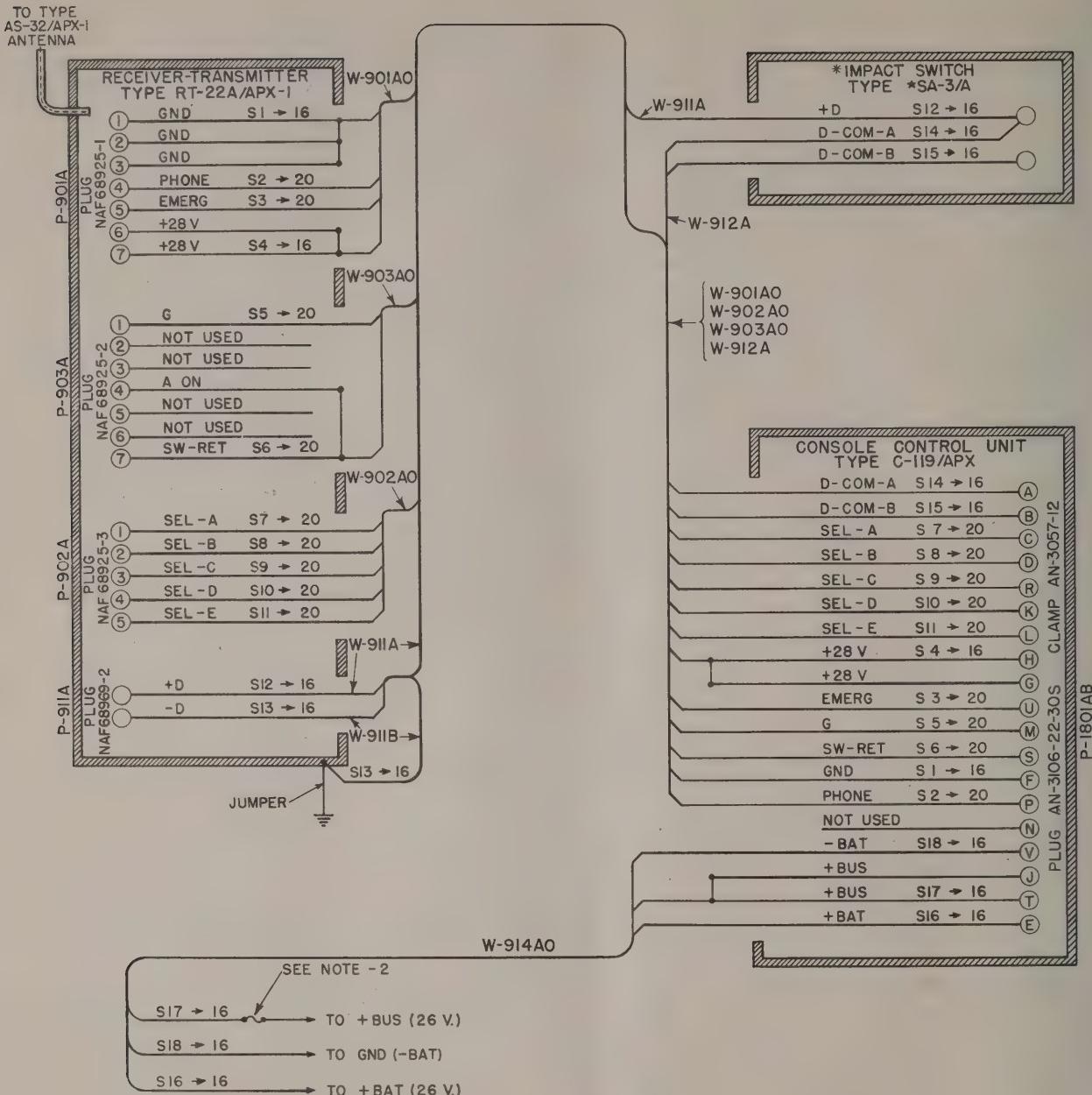
- This drawing applies to open wire installations of AN/APX-1A. The instructions for assembling the multi-conductor cables and plugs are found in Section II and Figure 4-10 of this handbook. This drawing based on a BuAer drawing.
- 20 ampere fuse\* or circuit breaker.\*
- All cables\* are to be the same color and are to conform to AN-J-C-48a.
- Shielding of wires, when required, is to conform to the U. S. Army specification 95-27273-G.
- Cable installations are to conform to AN-W-14. To designate a break in any wire, the two or more wires resulting from this break shall be identified by a different letter placed after the wire number of the code.

Example:

S12A → 16 -- S12B → 16  
 S12A → 16 -- S12C → 16  
 S12A → 16 -- S12D → 16  
 or: S12A → 16 -- S12B → 16 -- S12C → 16

\*All cables and all components with an asterisk (\*) are not supplied by the equipment manufacturer.

**Figure 4-8. Open Wiring System Diagram for 1B Installation System of AN/APX-1A**



#### NOTE

- This drawing applies whenever Console Control Unit installations of AN/APX-1A (only) are made. The instructions for assembling the multi-conductor cables and plugs are found in Section II and Figure 4-10 of this handbook. This drawing based on a BuAer drawing.
- 20 ampere fuse\* or circuit breaker\*.
- All cables\* are to be the same color and are to conform to AN-J-C-48a.
- Shielding of wires, when required, is to conform to the U. S. Army specification 95-27273-G.
- Cable installations are to conform to AN-W-14. To designate a break in any wire, the two or more wires resulting from this break shall be identified by a different letter placed after the wire number of the code.

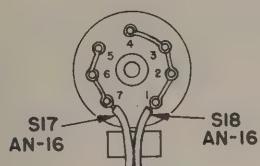
Example:

S12A → 16 → S12B → 16  
S12C → 16  
S12D → 16

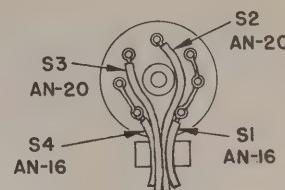
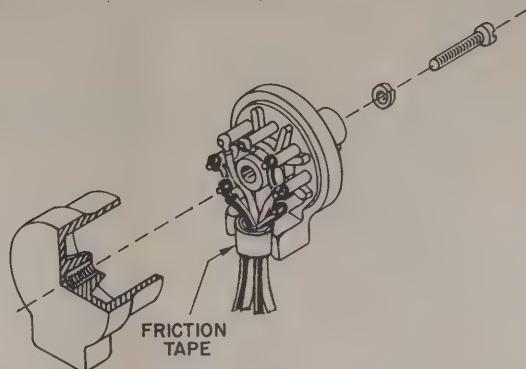
or: S12A → 16 → S12B → 16 → S12C → 16

\*All cables and all components with an asterisk (\*) are not supplied by the equipment manufacturer.

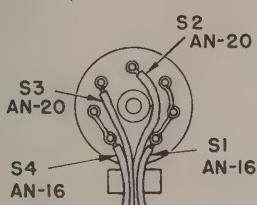
Figure 4-9. Open Wiring System Diagram for 2B Installation System of AN/APX-1A



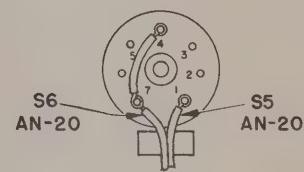
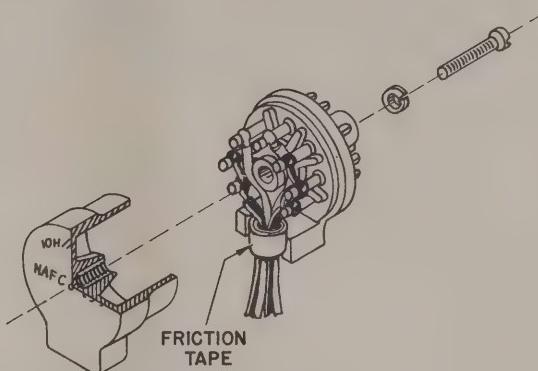
P-905A



P-901A



P-907A



P-903A

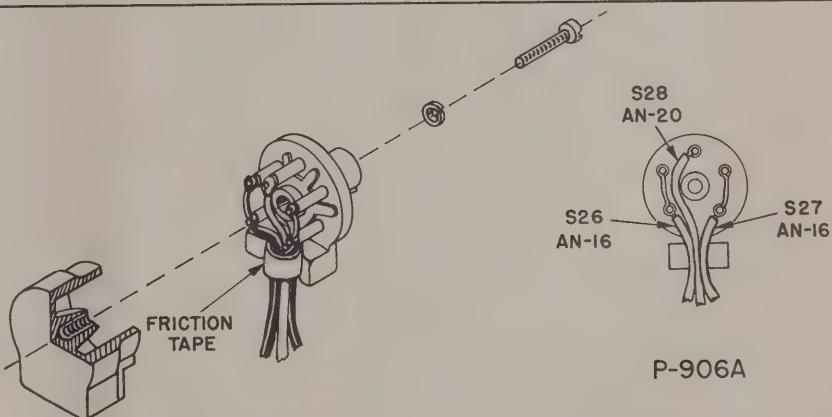
**KEY TO SYMBOLS.**

S1, S2, etc.—Wire numbers as used in Figure 4-8.

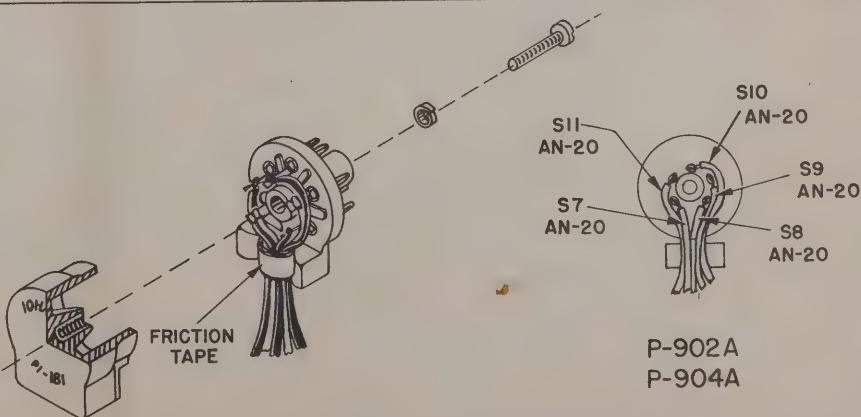
AN-16, etc.—Wire size conforming to specifications referred to in Figure 4-8.

**PLUG AND CABLE ASSEMBLY.**

1. Disassemble plug cap and body as shown in exploded views.
2. Strip 5/16" of insulation from the end of each wire (or more if necessary) of the cable.
3. Twist each wire around proper plug terminal and solder in place.
4. Group the wires of the cable together and wrap sufficient friction tape around them to fill the plug opening when the cap is put back.
5. Reassemble plug making certain that the cap makes a tight fit around the friction tape but not so tight that cap will be damaged.

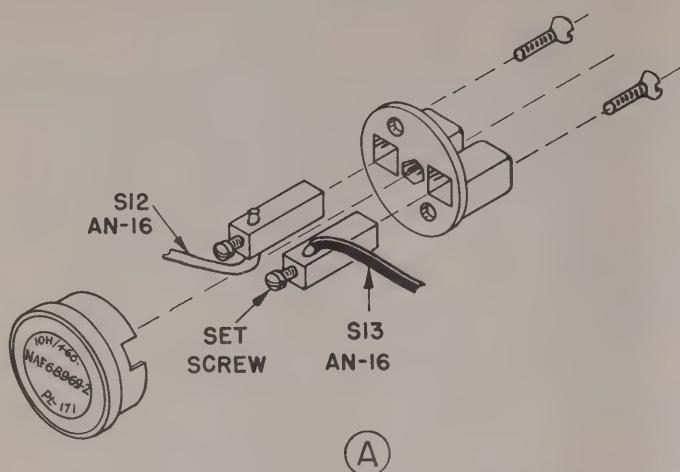


P-906A

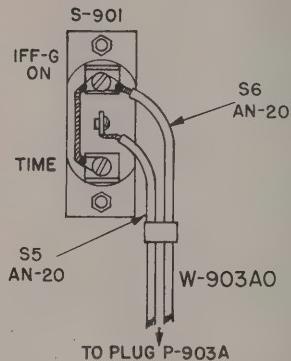
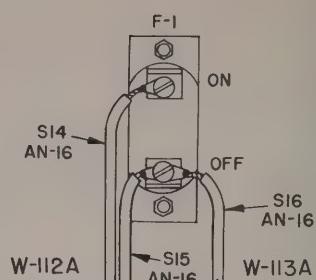


P-902A  
P-904A

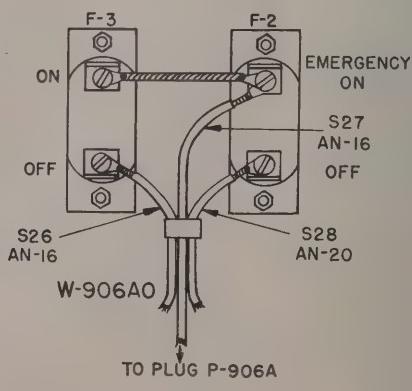
**Figure 4-10. Wiring Details of Inter-Unit Plugs (Exploded View)**

**"D"—PLUG AND CABLE ASSEMBLY.**

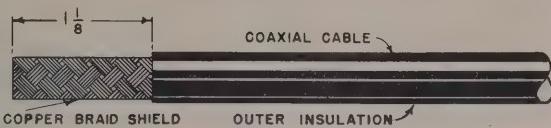
1. Disassemble the "D" plug as shown above.
2. Strip 5/16" of insulation from end of two AN-16 wires of the destructor cable W-912A.
3. Tin end of wire, insert in hole of plug terminal and tighten set screw.
4. Wrap friction tape around each wire at point where wire will pass thru notch in cover.
5. Reassemble plug, passing wire thru cover slots so that cover will grip around the tape.

**SWITCH WIRING NOTES.**

Figures B, C, and D identify the wires by number and size. These identifications conform to identification marks used in Figures 4-8 and 4-15. The plug termination at the other end of the cable is indicated on these drawings.

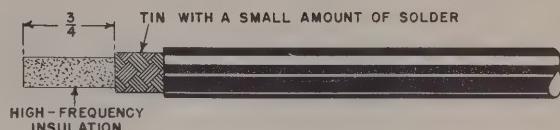


**Figure 4-11. Wiring Details of Pilot's Remote Control Switches and "D" Plug**



**Step 1**

Square off cable end and remove outer insulation, exposing copper shield.



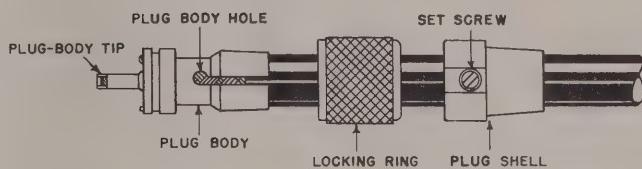
**Step 2**

Trim off copper shield as shown and tin the remaining exposed portion.



**Step 3**

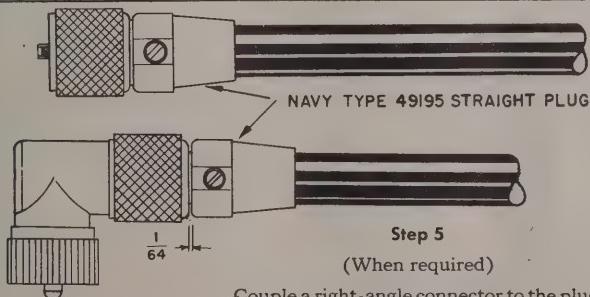
Trim off high-frequency insulation as shown and tin stranded copper core.



**Step 4**

Attach Navy Type 49195 straight plug to cable end as follows:

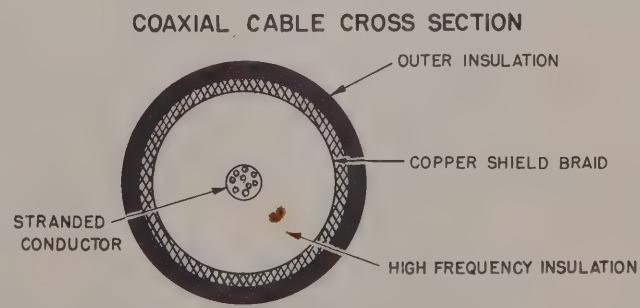
- Tin the inner wall of the plug-body tip by filling the tip only with solder and then shaking the solder out.
- Slide the plug shell and coupling ring on the cable and insert the cable end in the plug body, twisting so that the internal thread of the plug cuts a matching thread in the outer insulation of the cable. The end of the copper conductor should come to about  $\frac{1}{16}$  inch from the extreme end of the plug-body tip.
- Securely solder the end of the copper conductor to the plug-body tip (keeping the outside of the tip clean). Solder through and around the plug-body holes to ensure good bonding between the plug-body and exposed portion of copper shield beneath.
- Pull the locking ring over the plug-body, pull the plug shell up to the locking ring, and tighten the plug-shell set screw.



**Step 5  
(When required)**

Couple a right-angle connector to the plug.  
(For one end of W-908.)

RIGHT ANGLE CONNECTOR

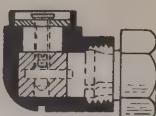


NAF-47024-107 OR RG-8/U

**Figure 4-12. Attachment of P-801 (Navy Type 49195) to W-908A (NAF-47024-107)**

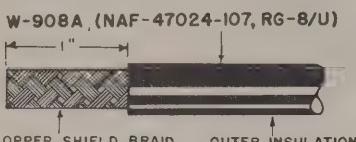
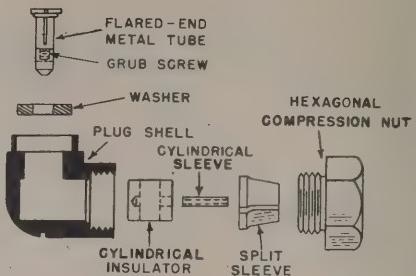


P-908A (NAF-47848-1, BRITISH IOH/70I)



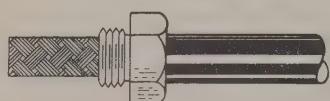
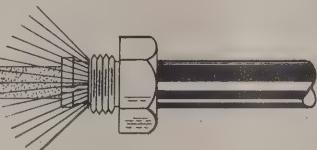
## Step 1

Disassemble plug P-908A by removing the hexagonal compression nut, taking out the split sleeve, loosening the grub screw at the bottom of the flared-end metal tube, and removing and discarding the cylindrical sleeve.



## Step 2

Square off the cable end and remove the outer insulation.

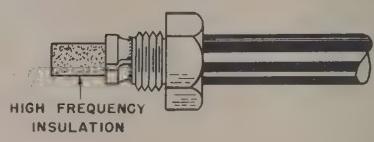


## Step 3

Force the compression nut on the cable end as far as it will go.

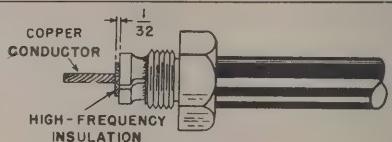
## Step 4

Fan out the copper shield braid, avoiding crossovers. Wedge the split sleeve between the braid and the high-frequency insulation.



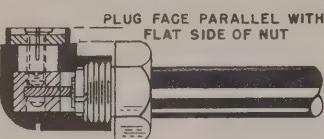
## Step 5

Trim off the copper shield braid close to the compression nut.



## Step 6

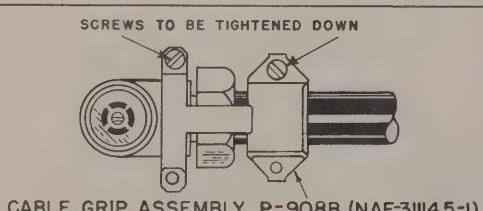
Trim off the high-frequency insulation as shown. Twist and tin the exposed copper conductor.



## Step 7

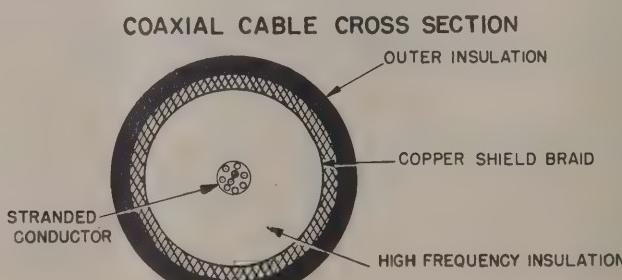
Attach plug P-908A to the cable end as follows:

- Place the cylindrical insulator in the plug-shell. Replace the grub screw in the bottom of the flared-end metal tube and insert the tube with its washer in the unthreaded end of the plug shell. Rotate the tube so that its "straight-through" hole lines up with the axial hole in the cylindrical insulator.
- Slide the plug shell over the cable so that the inner conductor goes through the axial hole in the cylindrical insulator and as far as it can go through the "straight-through" hole of the tube.
- Screw the compression nut and plug shell very tightly together and then tighten down the grub screw so that it firmly engages the inner conductor.



## Step 8

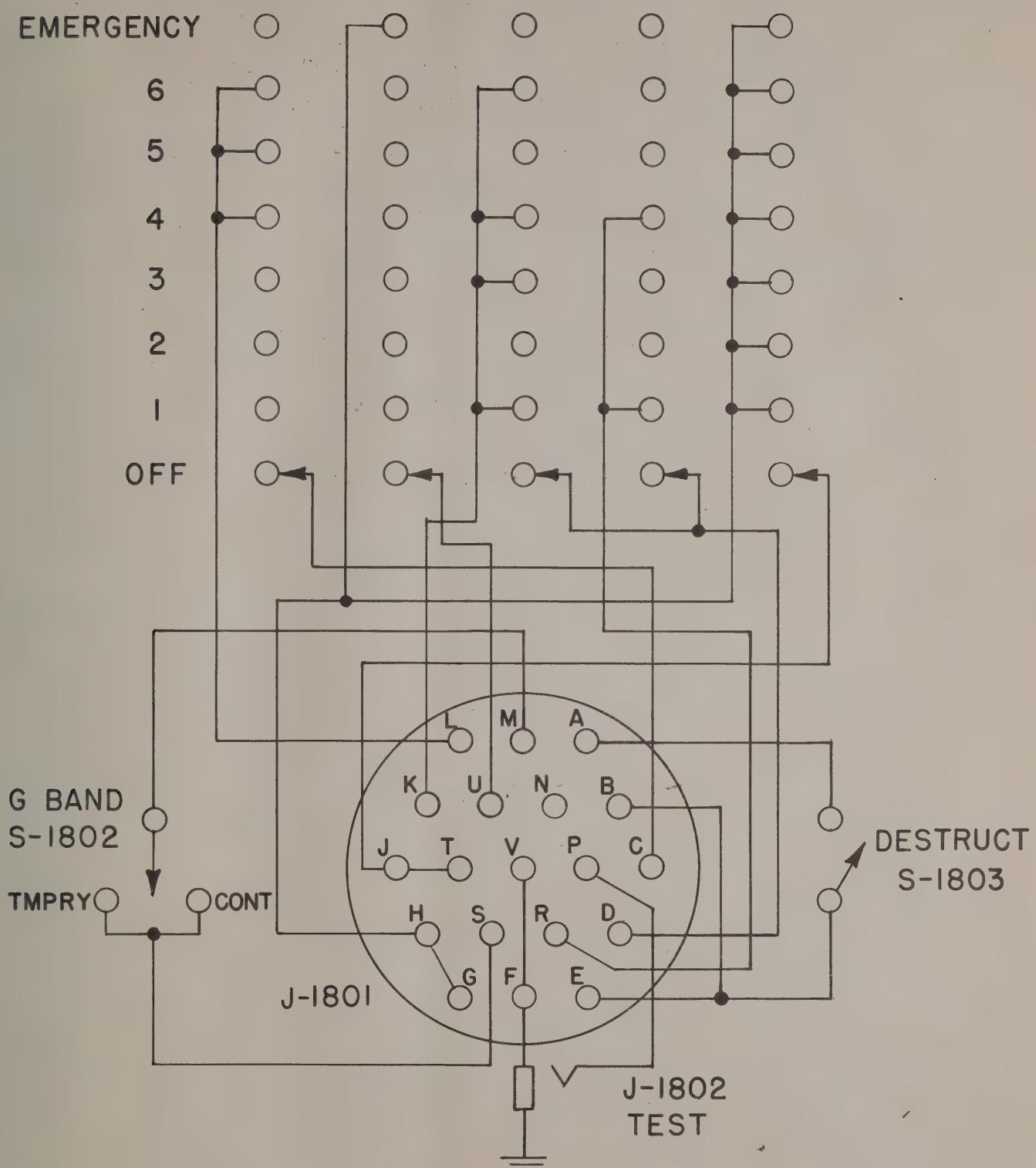
Install the cable-grip assembly P-908B (NAF-311145-1) on the completed plug-and-cable assembly as shown.



NAF - 47024 - 107 OR RG - 8/U

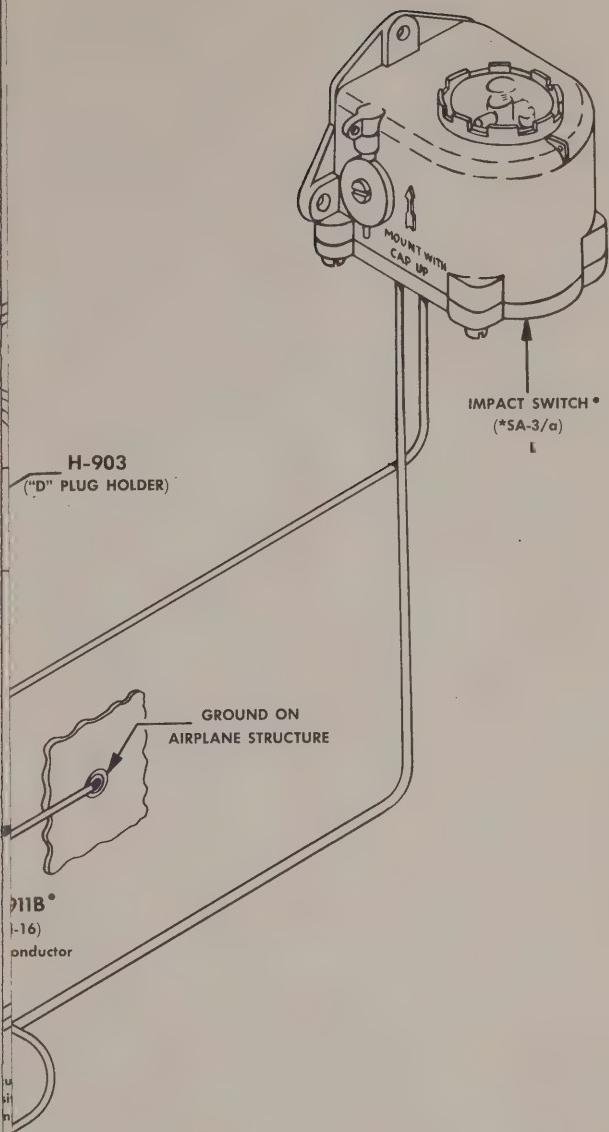
Figure 4-13. Attachment of P-908A (NAF-47848-1) to W-908A (NAF-47024-1)

CODE S-1801



**Figure 4-14.** Console Control Unit, Schematic Diagram



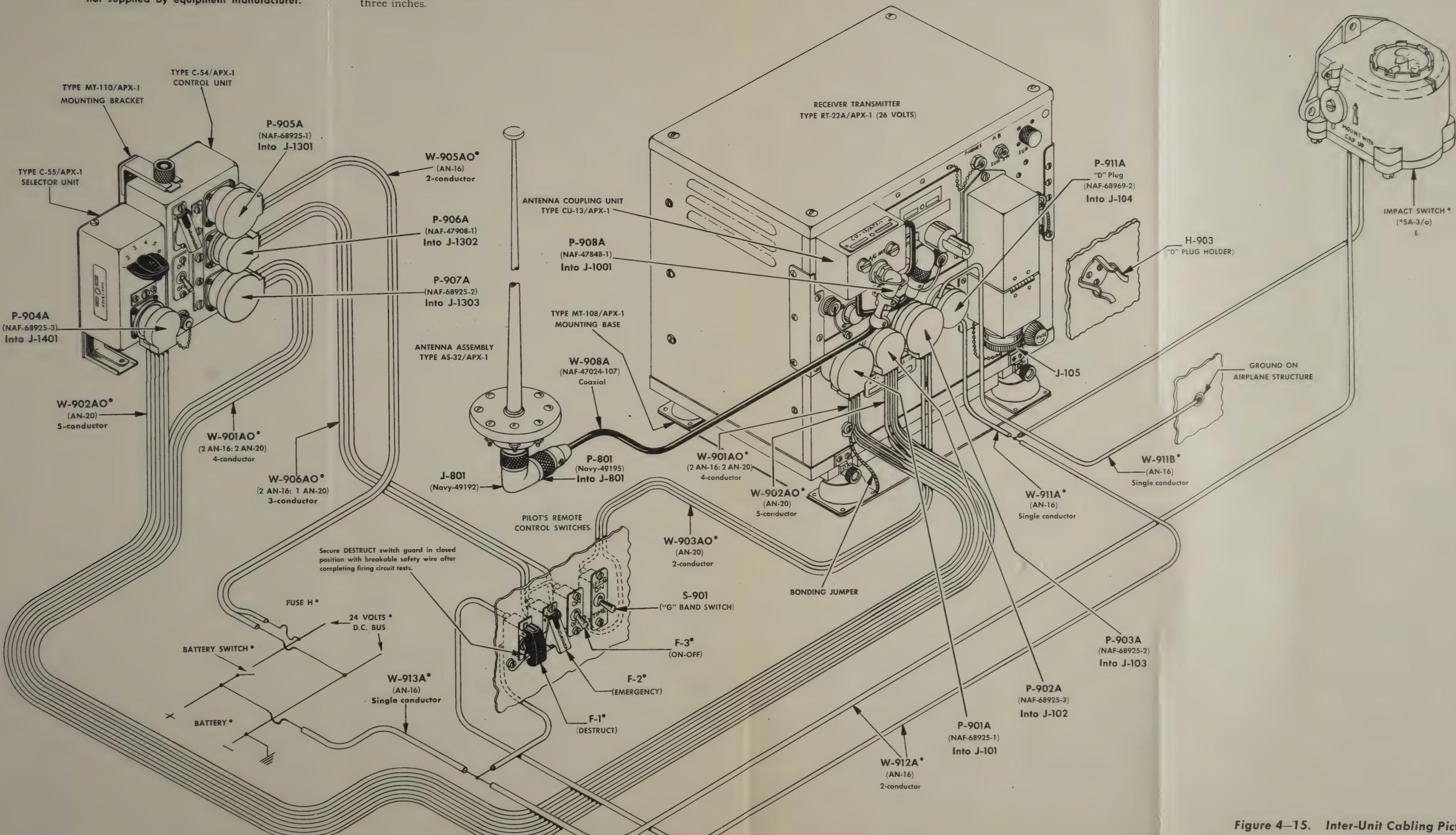


**Figure 4—15. Inter-Unit Cabling Pictorial  
Diagram for 1B Installation System of AN/APX-1A**

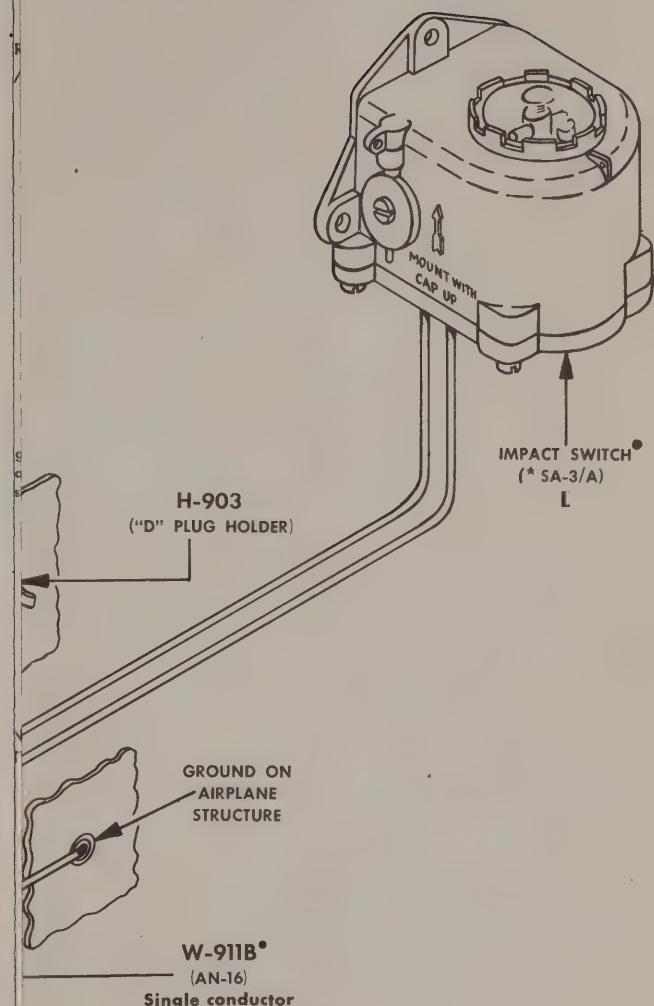


Items marked with bullet\* on this drawing  
not supplied by equipment manufacturer.

The minimum bending radius for all cables is  
three inches.







**Figure 4-16. Inter-Unit Cabling Pictorial  
Diagram for 2B Installation System of AN/APX-1A**



Items marked with bullet\* on this drawing  
not supplied by equipment manufacturer.

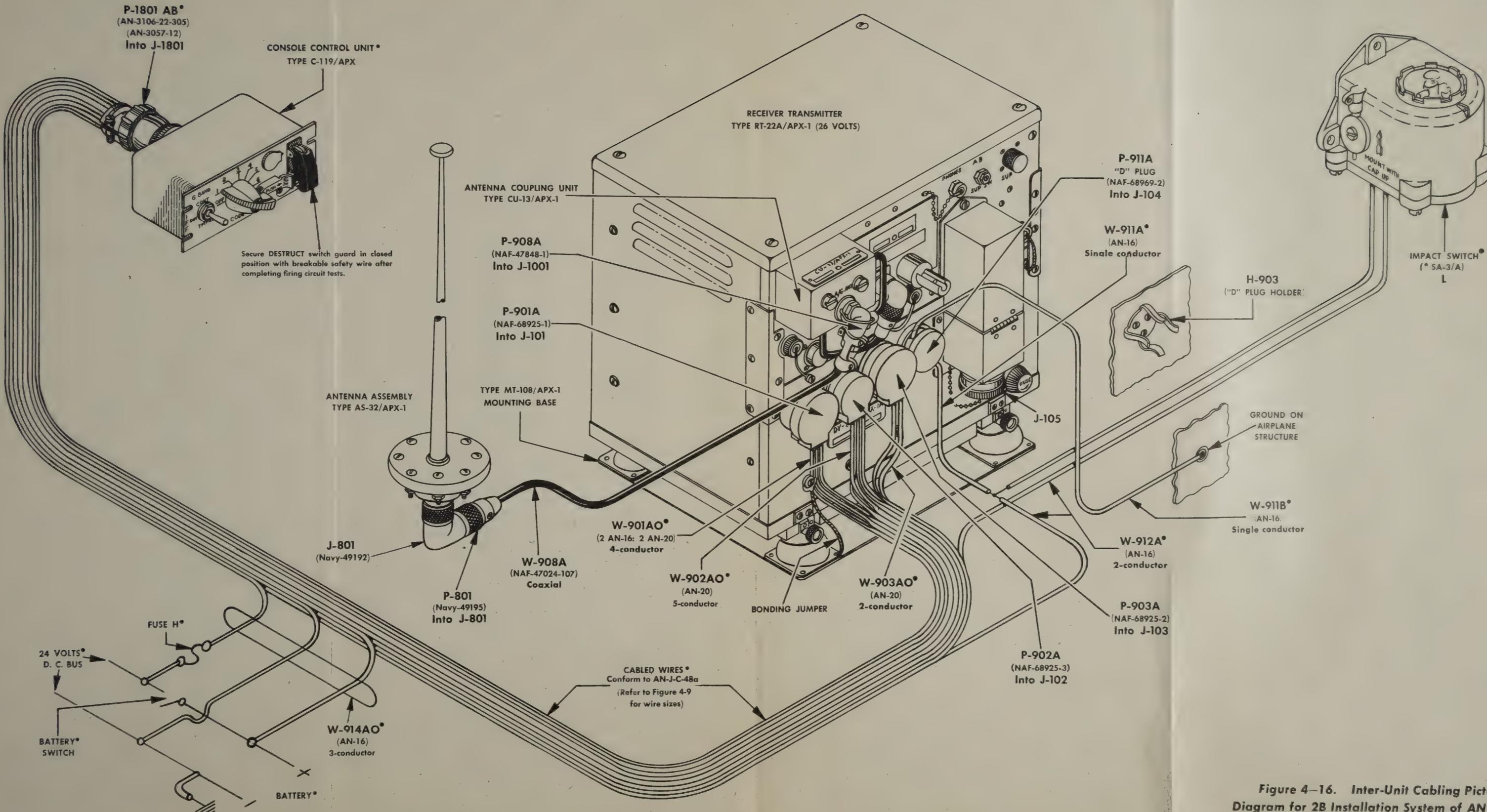
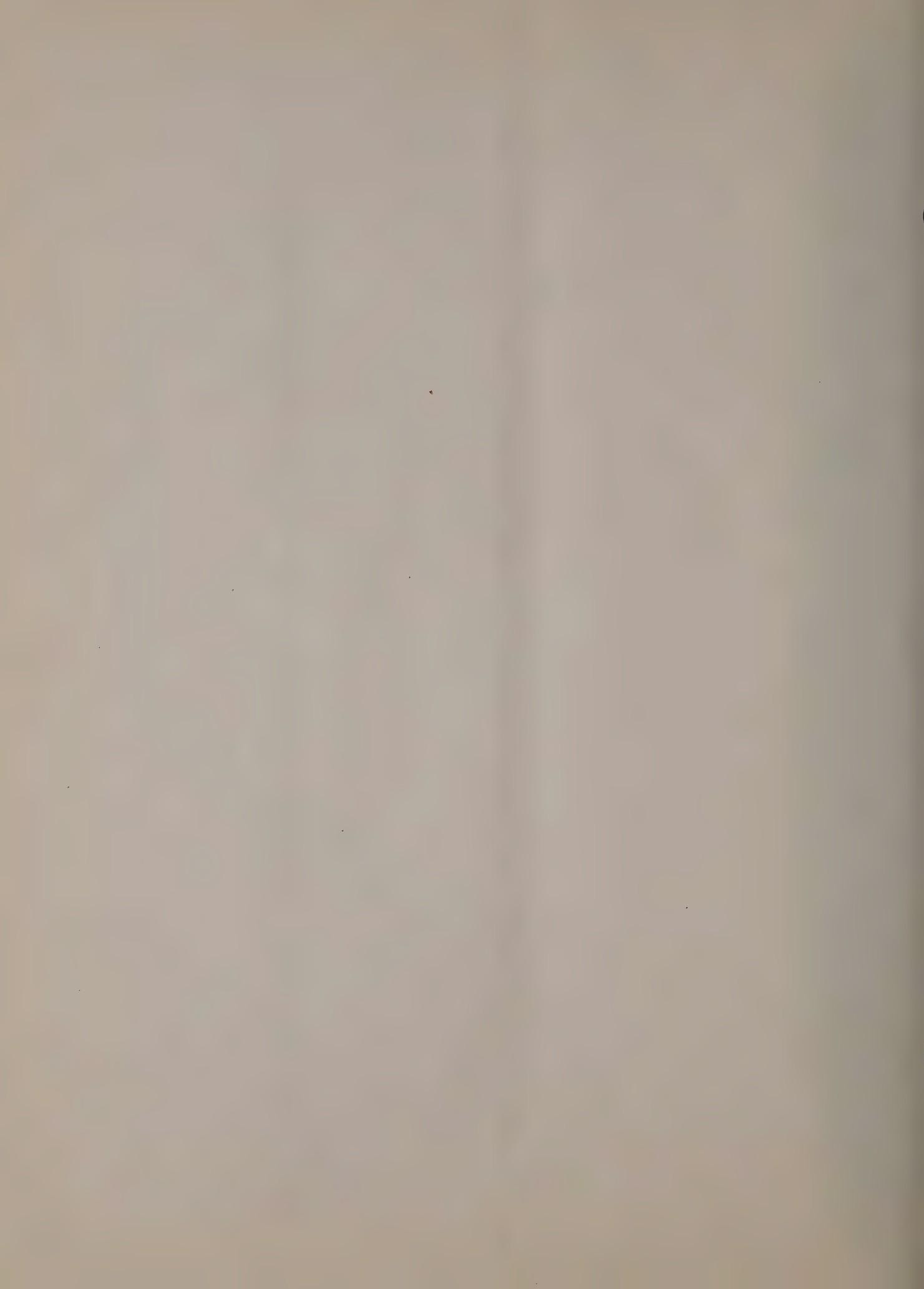


Figure 4-16. Inter-Unit Cabling Pictorial  
Diagram for 2B Installation System of AN/APX-1A



## **SECTION V**

# **EMERGENCY OPERATION AND REPAIR**

### **1. GENERAL.**

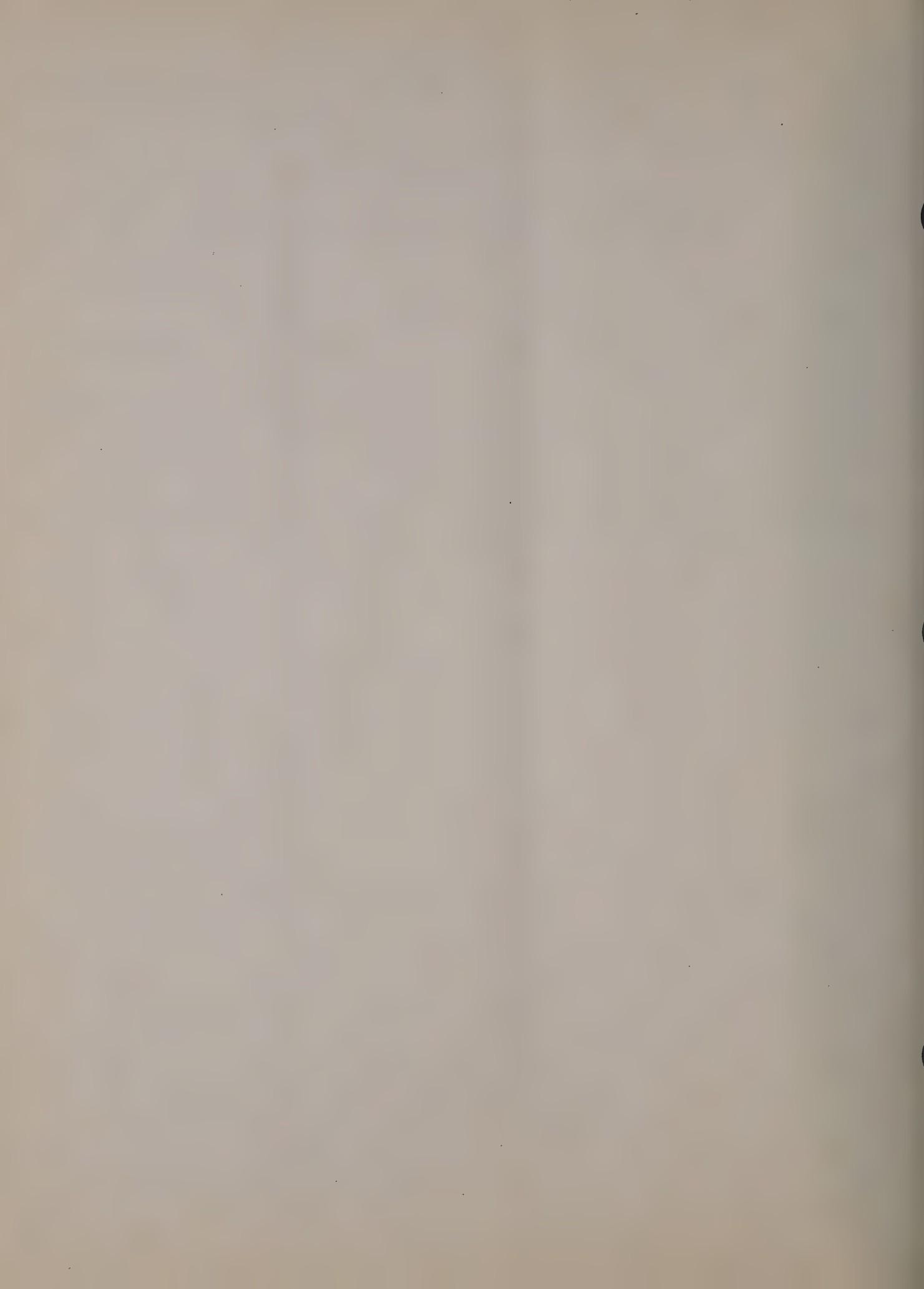
a. It is not intended that emergency repairs be made on the Model AN/APX-1A or AN/APX-1AX during flight. The receiver-transmitter unit should not be removed from the mounting base, nor should the covers or wrap-around be removed from the unit itself for the replacement of tubes or for any other purpose.

b. See Paragraph 2 of this section for checks that can be made during flight.

c. The term **EMERGENCY** appearing on one of the control-unit switches or on one of the pilot's remote-control switches should not be confused with the heading of this section. See Section III on the use of the **EMERGENCY** switches.

### **2. EMERGENCY CHECKS.**

- a. If the dynamotor and other rotating parts are not running, replace the line fuse "H" (Figure 4-15).
- b. Even though the dynamotor is running, the set cannot function if fuse F-101 is blown. Substitute spare fuse F-102 for fuse F-101.
- c. Dispose of damaged fuses so that they will not later be mistaken for good ones.
- d. Make certain that no plugs that are accessible are loose in their sockets.
- e. Be sure the grounding bond is tight.



## COLOR CODING OF COAXIAL JACKS AND CABLES IN AN/APX-1A AND AN/APX-1AX INSTALLATIONS

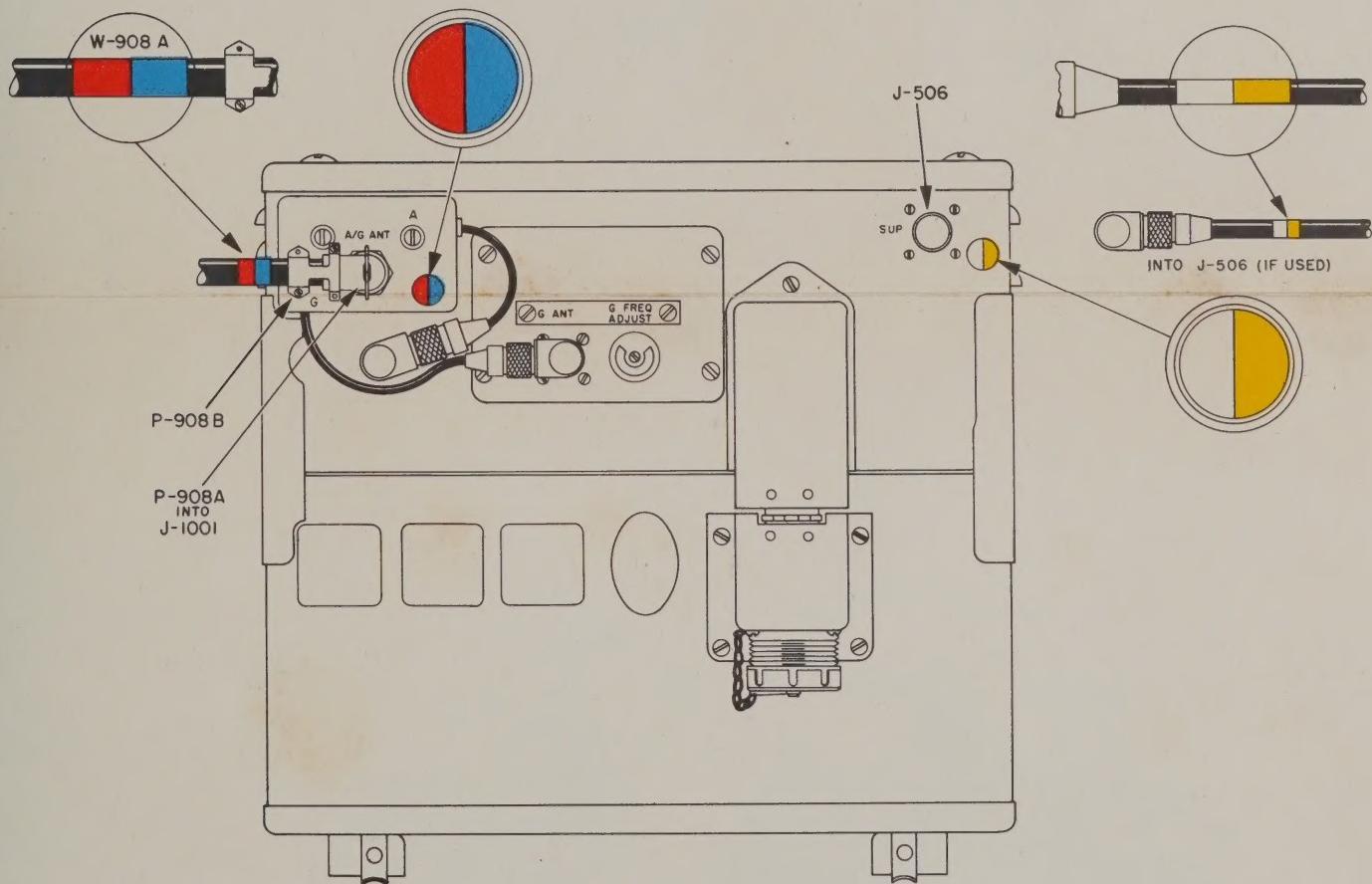
Color-coded identification circles are located near two coaxial jacks on the front panel of some late production receiver-transmitter units of the AN/APX-1A and AN/APX-1AX equipments. The color combination in the circle which identifies a jack is the same as that used on the corresponding coaxial cable. The cables are marked by wrapping one-half inch wide scotch tape around the cable at a point one inch back from the connector.

**Note:** The SUP jack J-506 is not ordinarily used. When not used it should be covered with the coaxial receptacle over H-902.

The drawing shows the coaxial jacks, the identifying circle and its coloring, and the color coding of the associated cable as used in AN/APX-1A and AN/APX-1AX installations. Color coding used in this equipment is as follows:

A/G ANT jack J-1001  
(and cable W-908A) Red and Blue

SUP jack J-506 (and cable if used) White and Yellow



Key to Color Coding of Coaxial Jacks and Cables in the AN/APX-1A and AN/APX-1AX Installations





